Wm Irvings

THE SEAMAN'S COMPLETE DAILY ASSISTANT:

BEING

An eaſy and correct Method of keeping a JOURNAL at SEA.

CONTAINING

Rules for working the Caſes in Plain, Middle Latitude, and Mercator's Sailing, by the Table of Difference of Latitude and Departure.—And for finding the Latitude, Longitude, Amplitude, and Azimuth, by Obſervation. Illuſtrated by a ſufficient Number of Examples.

LIKEWISE,

Rules ſhewing how the Allowances are to be made for Lee-way, Variation, Heave of the Sea, Setting of the Currents, &c.—And to correct the Dead Reckoning by an Obſervation, in all Caſes.

The new Method of finding the Latitude by two Altitudes of the Sun; and the finding the Longitude by the the Moon's Diſtance from the Sun, or a fixed Star; rendered eaſy to any common Capacity.

To which are added,

The Tables of Difference of Latitude and Departure to 300 Miles Diſtance; the New Solar Tables and Table of Natural Sines; with a larger and more correct Table of the Latitudes and Longitudes of Places, than any hitherto publiſhed; together with all the Tables neceſſary for the Seaman's Uſe in working a Day's Work at Sea.

The Whole conſtructed upon a NEW PLAN.

BY JOHN HAMILTON MOORE,

Author of the PRACTICAL NAVIGATOR,

And formerly of the Royal Navy.

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A correct Table of Difference of Latitude and Departure to every Point and Quarter Point of the Compaſs, to 300 *Miles Diſtance.*
Ditto for Degrees.
A large and correct Table of the Latitude and Longitude of Places.
A correct Table of Meridional Parts.
The New Solar Tables for finding the Latitude by two Altitudes.
A Table of Natural Sines.
A Table of the Riſing and Setting of the Sun, Moon, and Stars.

N. B. GENTLEMEN deſigned for, or belonging to the Sea, are boarded (if agreeable) and taught Navigation, the new Methods of finding the Latitude and Longitude at Sea, with the Uſe of the Globes, Inſtruments and Charts in a few Weeks, by the AUTHOR, No. 104, in the Minories, near Tower-Hill.

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NAVIGATION EPITOMISED,

And rendered eaſy to any common Capacity.

THE great End and Buſineſs of Navigation is, to inſtruct the Mariner how to conduct a Ship through the wide and pathleſs Ocean, to the remoteſt Parts of the World, the ſafeſt and ſhorteſt Way in Paſſages navigable: In order to which, he muſt be able, at all Times, to find the Courſe and Diſtance from one Place to another; and to determine the Place of the Ship every Day; what Courſe he muſt ſteer, and how far, to gain his intended Port.

The Ship's Place, at Sea, and indeed all other Places, are determined by their *Latitudes* and *Longitudes*.

The *Latitude* of any Place is its Diſtance from the Equator, counted upon an Arch of the Meridian North and South, and can never exceed 90 Degrees.

The *Equator* is that Line which divides the Earth into two equal Parts, the one North, and the other South; being 90 Degrees from each Pole.

The *Meridian* of any Place is a Line paſſing through that Place, the Equator, and Poles, and divides the Earth into two equal Parts, the one Eaſt, and the other Weſt; or it is that Line which the Sun comes upon when it is Twelve o'Clock. All Places that lie Eaſt or Weſt have their different Meridians; one of which is called the firſt Meridian, but variouſly placed: The Engliſh place theirs at London, the French at Paris, &c. and count the Longitude Eaſt and Weſt until they come to the oppoſite Meridian, which can never exceed 180 Degrees.

The *Difference* of Latitude is the leaſt Diſtance of the Parallels of Latitude of any two Places; ſhewing how far the One of them is to the Northward or Southward of the Other.

The Difference of Latitude between any two Places, being both North or both South, is found by ſubtracting the leſs Latitude from the greater; but if one Latitude be North and the other South, their Difference is found by adding both Latitudes together.

In North Latitude ſailing Northerly, or in South Latitude ſailing Southerly, you increaſe your Latitude; but in North Latitude ſailing Southerly, or in South Latitude ſailing Northerly, you decreaſe your Latitude, becauſe you ſail nearer to the Equator from whence the Latitude is reckoned.

Wherefore, in North Latitude ſailing Northerly, or in South Latitude ſailing Southerly, the Difference of Latitude added to the Latitude left, gives the Latitude in. But in North Latitude ſailing Southerly, and in South Latitude, ſailing Northerly, the Difference of Latitude ſubtracted from the Latitude left, gives the Latitude in.

When your Latitude decreaſes, and the Difference of Latitude is greater than the Latitude ſailed from, ſubtract the Latitude left from the Difference of Latitude, and the Remainder is the Latitude in, and of a different Name; for in this Caſe it is plain that you have croſſed the Equator.

What has been ſaid will be rendered eaſy by the following Examples.

Exam. I. What is the Difference of Latitude between London in Latitude 51° 32′ N. and Rome in Latitude 41° 54′ N.?

	D.	M.
From London's Lat.	51	32 N.
Subtract Rome's Lat.	41	54 N.
Remains Diff of Lat.	9	38
which mult. by	60	
Gives the Dif. in Miles	578	

Exam. II. Ship from Latitude 29° 17′ South, ſails Southerly until her Difference of Latitude be 374 Miles, what Latitude is ſhe come to?

	D.	M.
Latitude ſailed from	29	17 S.
Diff. of Lat. 374 divided by 60, is	6	14 S.
Lat. in —	35	31 S.

Exam. III. Required the Difference of Latitude between Cape Fineſterre and the Cape of Good Hope?

	D.	M.
Cape Fineſterre's Lat.	43	13 N.
Cape Good Hope's Lat.	34	22 S.
Diff. of Lat. —	77	35
	60	
Mult. by 60 is	4655 M.	

Exam. IV. A Ship in Latitude 8° 25′ N. ſails South 600 Miles, what Latitude is ſhe in?

	D.	M.
From Diff. of Lat. 600 Miles, or	10	00 S
Subtract Lat. left	8	25 N.
The Lat. in —	1	35 S.

In the laſt Example, it is plain, that as the Difference of Latitude is more than the Latitude left, the Ship muſt have croſſed the Equator, and conſequently have come into a South Latitude.

Note, When one of the Places has no Latitude, or is upon the Equator, then the Latitude of the other Place is their Difference of Latitude, and is always reduced into Miles by multiplying by 60, becauſe 60 Miles make a Degree of Latitude.

The *Longitude* of any Place is its Diſtance from the firſt Meridian, reckoned upon the Equator in Degrees Eaſt and Weſt, until it comes to the oppoſite Meridian, and can never exceed 180 Degrees.

Difference of Longitude is an Arch of the Equator, intercepted between the Meridian of two Places, ſhewing how far one of them is to the Eaſtward or Weſtward of the other.

The Difference of Longitude between two Places, being both Eaſt or both Weſt, is found by ſubtracting the leſs Longitude from the greater; but if one be in Eaſt, and the other in Weſt Longitude, the Difference is found by adding both Longitudes together.

Therefore, in Eaſt Longitude ſailing Eaſterly, or in Weſt Longitude ſailing Weſterly, the Difference of Longitude, added to the Longitude left, gives the Longitude in.

But in Eaſt Longitude ſailing Weſterly, or in Weſt Longitude ſailing Eaſterly, the Difference of Longitude ſubtracted from the Longitude left, gives the Longitude in.

When a Ship ſails Eaſt or Weſt until ſhe paſſes the oppoſite Meridian, or 180 Degrees, ſhe changes her Longitude, or comes into a Longitude of a different Name: and then the Longitude made ſubtracted from 360 Degrees, gives the Longitude in, and of a different Name with the Longitude left, as may be ſeen by the following Examples.

Exam. I. What is the Difference of Longitude between Cape Fineſterre and Antigua?

	D.	M.
Antigua's Long.	61	50 W.
Cape Finiſterre's Lon.	9	26 W.
Diff. of Long.	52	24
	60	
Diff. in Miles	3144	

Exam. II. A Ship from Cape Charles in Virginia, ſails Weſtward until her Difference of Longitude be 400 Miles, what Longitude is ſhe in?

	D.	M.
Cape Charles' Long.	76	07 W.
Diff. of Lon. 400 M. or	6	40 W.
Long. in ——	82	47

Exam. III. What is the Difference of Longitude between Barcelona and Liſbon?

	D.	M.
Barcelona's Long.	2	18 E.
Liſbon's Long.	9	3 W.
Diff. of Long.	11	21

Exam. IV. A Ship from 15° 40′ E. Long. ſails Weſtward till her Diff. of Long. be 27° 15′, what Longitude is ſhe in?

	D.	M.
Long. left	15	40 E.
Diff. of Lon.	27	15 W.
Long. in	11	35 W.

Exam. V. What is the Difference of Longitude between the N. of Japan and St. Chriſtopher's ?

	D. M.
Japan's N. Point	140 25 E.
St. Chriſtopher's	62 50W.
Exceeds 180 Degrees	203 15
	360
Diff of Long.	156 45

Exam. VI. A Ship from Long. 160° 20′ W. ſails Weſtward till ſhe differs her Longitude 41° 20′, What Longitude is ſhe in ?

	D. M.
Long. left	160 20W.
Diff. of Long.	41 20W.
	201 40
	360 00
Long. in.	158 20 E.

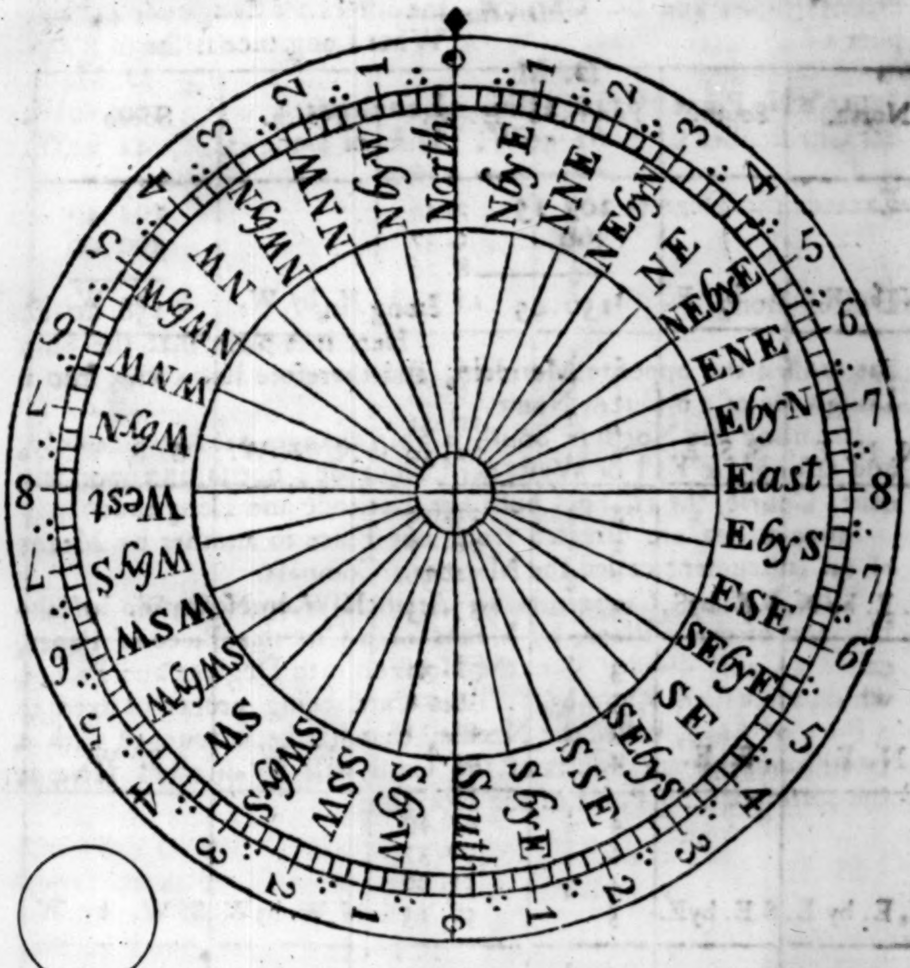
Here it is plain that the Ship has croſſed the oppoſite Meridian, and therefore has come into a Longitude of a different Name.

In ſailing due North or South, a Ship changes her Latitude only, and ſailing due Eaſt or Weſt, her Longitude ; but ſailing upon any other Courſe, ſhe changes both her Latitude and Longitude

Ships at Sea are directed from one Place to another by Means of an Inſtrument called the Mariner's Compaſs.

The *Mariner' Compaſs* is an Artificial Repreſentation of the Horizon of every Place, by Means of a Circular Piece of Paper, called a Card, divided like the Horizon into Degrees and Points, which are called Rhumbs. This Card being properly fixed to a Piece of Steel, called the Needle, that has been touched with a Loadſtone, all the Points of the Card will be directed towards the correſponding Point of the Horizon.

THE MARINER's COMPASS.



Hence it follows, that in every Place the North Point of the Card ſhews the Poſition of the Meridian at that Place, and ſome one Rhumb or Point of the Card will coincide with, or be directed along the Track that makes any given Angle with the Meridian: conſequently, by the Help of the Card or Compaſs, a Ship may be kept in any propoſed Track or Courſe.

A *Rhumb*, Line, or *Point*, is a Right Line drawn from the Center of the Compaſs to the Horizon, and is named from that Point of the Horizon it falls in with.

The *Courſe* is the Angle which any Rhumb Line makes with the Meridian, and is ſometimes reckoned in Degrees, and ſometimes in Points of the Compaſs; ſo that if a Ship ſails upon the ſecond Rhumb, or N. N. E. the Courſe is 22 Degrees 30 Minutes: And ſo for any other, as in the following Table, which the Learner ſhould be ſo well acquainted with, or the Compaſs, as to be able readily to tell how many Points any Courſes or Rhumbs are diſtant from the Meridian, or from the Parallel.

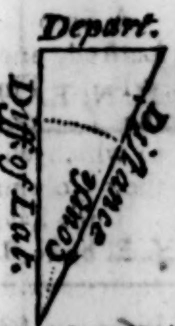
A Table of the Angles which every Point of the Compaſs makes with the Meridian.

North.	South.	Points.	D. M.	North.	South
		¼	2. 49		
		½	5. 37		
		¾	8. 26		
N. by E.	S. by E.	1	11 15	N. by W.	S. by W.
		1 ¼	14. 4		
		1 ½	16. 52		
		1 ¾	19. 41		
N. N. E.	S. S. E.	2	22, 30	N. N. W.	S. S. W.
		2 4/1	25. 19		
		2 ½	28. 7		
		2 ¾	30. 56		
N. E. by N.	S. E. by S.	3	33. 45	N. W. by N.	S. W. by S.
		3 ¼	36. 34		
		3 ½	39. 22		
		3 ¾	42. 11		
N. E.	S. E.	4	45.	N. W.	S. W.
		4 ¼	47. 49		
		4 ½	50. 37		
		4 ¾	53. 26		
N. E. by E.	S. E. by E.	5	56. 15	N. W. by W.	S. W. by W.
		5 ¼	59. 4		
		5 ½	61. 52		
		5 ¾	64. 42		
E. N. E.	E. S. E	6	67, 30	W. N. W.	W. S. W.
		6 ¼	70. 19		
		6 ½	73. 7		
		6 ¾	75. 56		
E. by N.	E. by S.	7	78. 45	W. by N.	W. by S.
		7 ¼	81. 34		
		7 ½	84. 22		
		7 ¾	87. 11		
	Eaſt.	8	90. 0	Weſt.	

The Uſe of the Tables of Difference of Latitude and Departure in working any of the Caſes in

PLANE SAILING.

PLANE SAILING is the Art of NAVIGATING a Ship upon Principles deduced from the Notion of the Earth's being an extended Plane, which may anſwer very well in ſhort Voyages near the Equator, and admits of ſix Caſes, which we ſhall work by the Tables of Difference of Latitude and Departure.



Note. Eaſting or Weſting in Plane Sailing, is called Departure; Northing and Southing, Difference of Latitude; and the Point or Rhumb the Ship ſails upon, is called the Diſtance. The Angle which that Point makes with the Meridian, is called her Courſe; and what that wants of 90 Degrees or 8 Points, is called the Complement of the Courſe; conſequently, the Courſe and Complement of the Courſe is always 8 Points, or 90 Degrees; ſo that ſubtracting the Courſe from 8 Points, or 90 Degrees, leaves the Complement of the Courſe.

In theſe Tables, the Courſe, if leſs than 4 Points or 45 Degrees, will be found at the Top of the Tables; but if it be more than 4 Points, or 45 Degrees, it will be found at the Bottom of the Tables; and in every Page there are 5 Columns for Diſtances, marked Diſt. which contain 60 Miles in each Column, the firſt beginning at 1 and ending at 60; the ſecond beginning at 61 and ending at 120; and ſo on to 300 Miles Diſtance; and to each of theſe Columns of Diſtance there belongs two other Columns, ſhewing the Difference of Latitude and Departure to any of thoſe Diſtances, marked Lat. and Dep. in which you are to obſerve, that if your Courſe be found at the Top of the Tables, then you are to take out the Difference of Latitude and Departure, as they are marked at the Top; but if your Courſe be found at the Bottom, then you are to take them as they are marked at Bottom.

When the Courſe is given in Points or Quarter Points, you muſt make uſe of the Table of Difference of Latitude and Departure, calculated for Points, &c. but when it is given in Degrees, or where it it is not given at all, you muſt make uſe of the Table of Difference of Latitude and Departure, calculated for Degrees; or ſearch in both Tables until you find a Difference of Latitude and Departure nearly correſponding with your Difference of Latitude and Departure given; or with the Difference of Latitude or Departure and Diſtance given; and then the Courſe will be found in its proper Column, either at the Top or Bottom.

CASE I.

Courſe and Diſtance given to find the Difference of Latitude and Departure.

EXAMPLE.

A Ship ſails N. N. E. 241 Miles, I demand her Difference of Latitude and Departure?

Rule. Find the Courſe among the Points or Degrees, either at the Top or Bottom, and find the Diſtance in its Column; oppoſite to which will be found the Difference of Latitude and Departure in their Columns.

Thus having found the Courſe, which is two Points, in the Table for Points, I find my Diſtance 241 in the Column for Diſtances, and right againſt that I find 222,7-Tenths for my Difference of Latitude, and 92,2-Tenths for my Departure.

Note. In all Caſes, if the given Side or Sides be in Miles, or Miles and Tenth of a Mile, then the Sides found by the Tables will alſo be in Miles; but if in Leagues, then the Side or Sides found will alſo be in Leagues.

CASE II.

Courſe and Difference of Latitude given, to find the Diſtance run and Departure from the Meridian.

EXAMPLE.

If a Ship ſails S. 48 Degrees Weſt, till her Difference of Latitude be 79 Leagues, I demand her Diſtance and Departure?

Rule. Find the given Courſe at the Top or Bottom of the Tables, either among the Points or Degrees; and in that Page, and right againſt the Difference of Latitude, taken in its Column, ſtand the Diſtance and Departure in their Columns.

Thus, the Courſe is 48 Degrees, which I find at the Bottom of the Table of Difference of Latitude and Departure for Degrees; and in the Column marked with Latitude at the Bottom, I look for my Difference of Latitude 79, the neareſt to which is 78,9-Tenths, oppoſite to which ſtand 118 in the Diſtance Column, and 87,7-Tenths in the Departure Column, which is the Diſtance and Departure required.

CASE III.

Courſe and Departure given to find the Diſtance and Difference of Latitude.

EXAMPLE.

If a Ship ſails N. E. by E. ¾ E. from a Port in 3 Degrees 15 Minutes South Latitude, uutil ſhe departs from her firſt Meridian 412 Miles, what is her Diſtance ſailed, and Latitude in?

Rule. Find your Courſe, which is 5 ¾ Points as before; then look in ſome of the Departure Columns belonging to that Courſe for your Departure, or the neareſt tbereto; the Diſtance and Difference of Latitude anſwering to that Departure, will be found in their reſpective Columns.

But in any Caſe, where the given Side is too large to be found in the Tables, divide it by 2, 3, 4, or any other convenient Number, that will make it ſmall enough to be found in the Tables; and then the required Sides, when found, muſt be multiplied by the ſame Number; but the Courſe muſt never be multiplied or divided.

Thus N. E. by E. ¾ E. being 5 ¾ Points, which I find at the Bottom of the Page; and then look into the Departure Column for Half my Departure 206, (the Whole being too large to be found in the Tables) and find 228 for the Diſtance, and 97, 5-Tenths for the Difference of Latitude, which being doubled, gives the Diſtance 456, and the Difference of Latitude 195.

Now, ſince the Ship has ſailed from a South Latitude Northerly,

	D.	M.
From the Latitude ſailed from	3	15 S.
Subtract the Difference of Lat. 195 Miles, or	3	15 N.
	0	0

The Difference being nothing, ſhews that the Ship is upon the Equator.

CASE IV.

Diſtance and Difference of Latitude given, to find the Courſe and Departure.

EXAMPLE.

Suppoſe a Ship ſails between the North and Weſt until her Diſtance be 276 Miles, and her Difference of Latitude be 211,4, what is her Courſe and Departure?

Rule. Seek in the Tables till againſt the Diſtance taken in its Column, be found the given Difference of Latitude in one of the following Columns, and adjoining to it ſtands the Departure, which, if leſs than the Difference of Latitude, the Courſe is found at the Top of the Column; but if greater, the Courſe is found at the Bottom.

Now taking the Diſtance, I ſeek till againſt Diſtance 276 ſtands 211,4, which I find ſtanding together under 40 Degrees; oppoſite to which ſtands 177,4; and as my Difference of Latitude is more than my Departure, I find my Courſe at the Top, which is 40 Degrees. Now to reduce this Courſe into Points, I look into the Table following the Compaſs for the neareſt to it, which is 39° 22′; oppoſite to that ſtands 3 ½ Points; and as my Courſe is between the North and Weſt, I ſet down N. W. by N. ½ W. which is my Courſe nearly.

CASE V.

Diſtance and Departure given, to find the Courſe and Difference of Latitude.

EXAMPLE.

From Latitude 50° 13′ N. a Ship, in ſailing between the South and Eaſt 98 Miles, makes her Departure 82 Miles; what Courſe did ſhe ſteer, and what Latitude is ſhe in?

Rule. Seek in the Tables till againſt the Diſtance taken in its Column, be found the given Departure in one of the following Columns; and adjoining to it ſtands the Difference of Latitude; which, if greater than the Departure, the Courſe is found at the Top of the Column; but if leſs, the Courſe is found at the Bottom.

Now ſeeking till againſt the Diſtance 98 ſtands 82, the neareſt will be 82, 2, ſigned Departure at Bottom; and here the Difference of Latitude is 53,4, and the Courſe is 57 Degrees: but wiſhing to find them ſtill nearer, I turn to the Table of Points, and there againſt Diſtance 98 ſtands 81, 5, and 54, 4; and as 81, 5 is found in the Column ſigned Departure at Bottom, I there find my Courſe to be 5 Points; therefore, ſince the Ship has ſailed between the South and Eaſt, I take S. 57° E. or S. E. by E. for my Courſe.

Now, from the Latitude ſailed from 50° 13′, take the Difference of Latitude 54, becauſe ſailing Southerly, and there remains 49° 19′, the Latitude in. *Note.* When the Tenths are under 5, they are generally omitted; but if above 5, one is allowed for them.

CASE VI.

Difference of Latitude and Departure here given to find the direct Courſe and Diſtance.

EXAMPLE.

A Ship in Latitude 40° 10′ North, is bound to a Port in Latitude 41° 2′ N. the Departure between the two Places is 33 Miles Eaſt; I demand upon what Courſe ſhe muſt ſail, and how far, to gain her intended Port?

	D. M.
From the Latitude the Ship is bound to	41 2 N.
Subtract the Latitude the Ship ſails from	40 10 N.
Difference of Latitude	0 52 Miles.

Seek in the Tables till the given Difference of Latitude and Departure are found together in their reſpective Columns; then right againſt them will be found the Diſtance in its Column; and the Courſe ſtands among the Degrees or Points at the Top or Bottom of the Column where the Difference of Latitude and Departure were found.

Now taking the Difference of Latitude 52, and Departure 33, I find that the Numbers ſtanding together neareſt to theſe are 52,6, and 32,9; and the Diſtance anſwering to theſe is 62; and as my Difference of Latitude is greateſt, I find 32 Degrees at the Top for my Courſe; and ſince the Ship ſails between the North and Eaſt, the Courſe is N. 32° E. or N. E. by N. neareſt, Diſtance 62 Miles.

Having learned theſe neceſſary Caſes concerning a ſingle Courſe, the next is a Compound Courſe, commonly called a *Traverſe.*

A *Traverſe* is when a Ship, meeting with contrary Winds, ſails upon ſeveral Courſes.

To reſolve a Traverſe, is to reduce or bring the ſeveral Courſes into one; the Courſes are known by the Compaſs; and the Diſtances by the Log; which, in common Voyages, is heaved once in Two Hours; but in Ships of War, or ſailing to the Eaſt Indies, every Hour.

In the Steerage, or ſome convenient Place in the Ship, there generally hangs a Table, called the *Log Board,* divided into Seven Columns. In the Firſt, is written the Hours of the Day. In the Second, the Knots the Ship runs during Half a Minute; each of theſe Knots bears the ſame Proportion to a Sea Mile that Half a Minute does to an Hour; conſequently, ſo many Knots the Ship runs in Half a Minute, ſo many Miles ſhe runs in an Hour. In the Third, the Fathoms; Ten of which ought to make a Knot. In the Fourth, the Courſes ſteered by the Compaſs. In the Fifth, the Winds. In the Sixth, the Lee-Way. And in the Seventh, the Tranſactions of the Day, as in the following Table. Every Day at Noon, the Log Board is tranſcribed into the Log Book, which is divided into Columns exactly like the Log Board; and the ſeveral Courſes being corrected for the Lee-Way and Variation, and the Diſtance run upon each Courſe being ſet down in the Traverſe Table, ſhews what Difference of Latitude and Departure the Ship has made during the laſt 24 Hours; and from thence is found the Latitude and Longitude the Ship is in. The Operation is called, Doing a Day's Work.

The LOG BOARD.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Tranſactions.
2	6		S. W. by S.	N.		
4	5	5				
6	5			N. W.		
8	5					Moderate Gales and Cloudy Weather; at 8 A. M. ſaw ſeveral Ships to the Weſtward.
10	4	5	N. E.	N. N. W.		
12	4	5				
2	4	5				
4	4	5				
6	4	5				
8	5		S. W. by S.	W.N.W.		
10	4	5				
12	4					

Having placed the Courſes and Diſtance run upon each, I begin with the firſt Courſe, S. W. by W. which is 5 Points, and the Diſtance run upon it being ſummed up, is 21,5, or an Half; which being doubled (becauſe the Log was hove every Two Hours) is 43. In like Manner proceed with the other Courſes; and then find the Difference of Latitude and Departure for each Courſe and Diſtance.

When the Courſe is to the Southward, the Difference of Latitude, when found, muſt be ſet under the Column marked S. or South; but if to the Northward, in that marked N. or North; likewiſe when the Courſe is to the Eaſtward, the Departure muſt be ſet in the Column marked E. or Eaſt; but if to the Weſtward, in that marked W. or Weſt. Thus the firſt Courſe being S. W. by S. the Difference of Latitude belonging to it is ſet under S. and Departure under W. as in the following Table:

The TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. W. by S.	43		35.8		23.9
N. by E.	45	31.8		31.8	
S. W. by S.	27		22.4		15.0
		31.8	58.2 31.8	31.8	38.9 31.8
	Diff. of Lat. S.		26.4	Dep. W.	7.1

Here the Weſtings being greater than the Eaſtings, the Difference ſhews how far the Ship has got to the Weſtward; and the Southings being greater than the Northings, ſhew how far the Ship has got to the Southward of the Place ſhe ſet out from.

EXAMPLE.

A Ship from the Lizard in Latitude 49° 57′ N. is bound to a Port in Latitude 51° 49′ N. whoſe Departure from the Lizard is 162 Miles Weſt, ſteers the following Courſes as per Log, viz. S. S. W. 54 Miles; W. by S. 39 Miles; N. W. by N. 40 Miles; N. E. by E. 69 Miles; N. N. W. 60 Miles.

Required the direct Courſe and Diſtance made good upon theſe ſeveral Courſes; the Latitude the Ship is in, and what Courſe ſhe muſt ſteer, and how far, to gain her intended Point?

I begin with the firſt Courſe, S. S. W. or Points, under which, in the Tables, and oppoſite to the Diſtance 54 Miles, ſtands 49,9 for my Difference of Latitude, and 20,7 for my Departure; and as the Courſe is between South and Weſt, I ſet the Difference of Latitude in the Column marked S. and the Departure in the Column marked W. In like Manner I proceed with each Courſe and Diſtance; which being found as above, will ſtand as in the following Traverſe Table:

Courſe.	Diſt.	N.	S.	E.	W.
S. S. W.	54		49,9		20,7
W. by S.	39		7,6		38,2
N.W.by N.	40	33,3			22,2
N. E. by E.	69	38,3		57,4	
N. N. W.	60	55,4			23,0
		127,0	57,5	57,4	104,1
		57,5			57,4
Diff.of Lat.Northerly 69,5			Dep. Weſterly 46,7		

Having placed them as above, I add up all the Northings, Southings, Eaſtings, and Weſtings, ſeparately, and ſet down their reſpective Sums at the Bottom of each Column; and as the Weſtings are greater than the Eaſtings, I ſubtract the one from the other, and the Difference, 46,7, ſhews that the Ship has departed ſo much Weſt of her firſt Place.

Again, the Northings being greater than the Southings, I ſubtract the Leſs from the Greater, and the Remainder, 69,5, ſhews how far the Ship is to the Northward of her firſt Place.

Now having the Difference of Latitude 69,5, and the Departure 46,7, made good upon the ſeveral Courſes, I ſeek in the Tables until they are found ſtanding together in their reſpective Columns, the neareſt to which is 69,5, and 47, ſtanding together under 34 Degrees; and againſt them ſtands 84 for the Diſtance. Hence the Courſe made good upon the ſeveral Courſes, is N. 34 Degrees W. or N. W. by N: nearly, and Diſtance 84 Miles.

To find the direct Courſe and Diſtance to the intended Port.

To the Latitude left 49° 57′ N. add the Difference of Latitude made 69, or 1 Degree 9 Minutes, gives 51° 6′ N. the Latitude in.

	D. M.		
From the Lat. of the intended Port	51 49 N.	Departure between the Ports	162,0 W.
Subtract Lat. in	51 6 N.	Sub. Dep. made	46,7 W.
Diff. of Lat. between Ship and Port	43	Dep. between Ship and Port	115,3 W.

With Difference of Latitude 43, and Departure 115,3, I ſeek in the Tables till they are found ſtanding together in their reſpective Columns; the neareſt to which I find ſtanding over 69 and 70 Degrees, which, being added together, is 139°; Half that Sum is 69° 30′; the Courſe, and Half the Diſtances belonging to theſe Courſes, is 123 Miles.

Hence the direct Courſe from the Ship to her intended Port is N. 69° 30′ W. or nearly W. N. W. ¼ W. Diſtance 123 Miles.

Another Example to exerciſe Traverſe Sailing.

A Ship in the Latitude 17° 10′ N. is bound to a Port in the Latitude of 13° 10′ N. the Departure being 180 Miles Weſtward, ſails theſe Courſes:

S. W. by W. 27 Miles; W. S. W. ½ W. 30 M. W. by S. 25 M. W. by N. 18 M. S. S. E. 32 M. S. S. E. ¾ E. 27 M. S. by E. 25 M. S. 31 M. S. S. E. 39 Miles.

Required her preſent Latitude, and the direct Courſe and Diſtance to the deſired Port?

Anſwer, The preſent Latitude is 14° 21′ N. Courſe S. 62° W. or S. W. by W. ½ W. and Diſtance 150 Miles.

The Uſe of the Tables of Difference of Latitude and Departure in working the moſt uſeful Caſes in MERCATOR *and* MIDDLE LATITUDE SAILING.

IN PLANE SAILING the Earth was conſidered as a Plane, repreſenting a Bowling Green, having the Meridians parallel to each other, and, conſequently, the Degrees of Longitude equal in all Places; but this cannot be true, as the Earth is a Sphere or Globe: For,

As the Meridians are great Circles on the Globe, croſſing the Equator, and meeting at the Poles, it is plain that any two of theſe Circles muſt be farther aſunder the farther they are from the Poles; and the greateſt Diſtance between them will be upon the Equator, which is equally diſtant from each Pole, and there the Diſtance is 60 Miles; but in the Latitude of 60° North or South, the Diſtance is no more than 30 Miles.

The true Place of a Ship at Sea depends upon its Latitude and Diſtance from ſome noted Meridian; and ſince the Meridian Diſtance, that is, the Diſtance between two Meridians, varies in every Latitude, it is therefore neceſſary that this Diſtance ſhould be reckoned in ſome fixed Latitude, and where the Degrees are of the ſame Magnitude, which can be no where but upon the Equator.

Now, in order to turn this Meridional Diſtance, or Departure, into Longitude; and be able to aſcertain the Ship's Place at Sea, we muſt have recourſe to Middle Latitude, or Mercator's Sailing, where the Earth is conſidered as a Globe. The principal Caſes are as follow:

Note. In working all Caſes in *Mercator's Sailing*, we muſt make uſe of the Table of Meridional Parts, which are Numbers, ſhewing how far each Degree and Minute of Lat. is enlarged, ſo as to keep a due Proportion with the decreaſing of the Degrees of Long. in every Lat. Therefore, to find the Meridional, or an enlarged Difference of Latitude, between any two Places, firſt, in the Table of Latitude and Longitude, find the Latitudes of the given Places; with which, ſeek for the Degrees on the Upper Part of the Table marked D. for Degrees; and in the right or left Hand Columns, for the Minutes, marked at the Top with M. oppoſite to which, and under the Degrees, are the Meridional Parts; and then add, or ſubtract, as the Caſe requires.

Thus, ſuppoſe the Meridional Parts belonging to the Latitude of Cape Clear in Ireland were required? Firſt, find the Latitude of Cape Clear, which is 51° 12′ N. then, in the Table of Meridional Parts,

Parts, ſeek 51° at the Top, and 12′ in the Side Columns; oppoſite to that, and under 51°, ſtands 3588, the Meridional Parts required. The ſame may be obſerved of any Number of Degrees and Minutes required.

To exhibit, at one View, theſe different Kinds of Sailing, I ſhall ſhew how to work the following Caſes, by Mercator's and Middle Latitude Sailing, in oppoſite Columns in the ſame Page; leaving the Mariner to chuſe which of them he thinks proper to find his Difference of Longitude by, either of them being ſufficient for his Purpoſe at Sea.

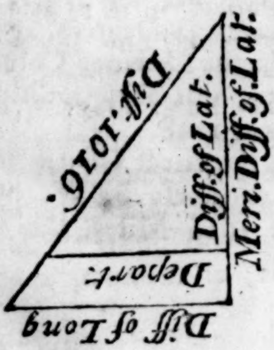
CASE. I.

The Latitudes and Longitudes of two Places given, to find the direct Courſe and Diſtance between them.

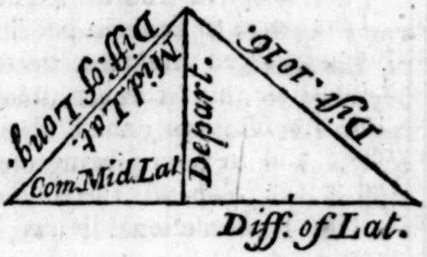
EXAMPLE.

What is the Courſe and Diſtance between Cape Clear, in Ireland, and St. Mary's, one of the Azores?

	D.	M.				D.	M		D.	M.
Cape Clear's Lat.	51	12N.	Mer. Parts	3588	Longitude	9	45W.	Latitude	51	12N.
St. Mary's Lat.	37	0N.	Mer. Parts	2393	Longitude	22	56W.	Latitude	37	0N.
Diff. of Lat.	14	12	Mer. Dif. of Lat.	1195	Diff. of Lon.	13	11	Sum's Lat's	88	12
	60					60				
								Mid. Lat.	44	6
Diff. of Lat. in Miles	852				Diff. in Miles	781			90	0
								Com. Mid. Lat.	45	54



The Difference of Longitude to be worked as Departure.



The Complement of Mid. Lat. to be worked as a Courſe, and the Diff. of Long. as Diſtance.

By Mercator's Sailing.

By viewing the Figure, it will evidently appear, that by enlarging the Difference of Latitude, the Difference of Longitude will bear the ſame Proportion to the enlarged Difference of Latitude, that the proper Difference of Latitude bears to the Departure, and the Courſe continues the ſame.

Therefore, ſeek the Meridional Difference of Latitude and Difference of Longitude together, as if they were really proper Difference of Latitude and Departure, and the Courſe will be found among the Points or Degrees, as in Caſe VI. in Plane Sailing.

Then with the Courſe and proper Difference of Latitude, find the Diſtance:

Thus, taking the one Tenth of 1195, the Meridional Difference of Latitude, and 791, the Difference of Longitude, viz. 119,5 and 79,1, the neareſt Numbers to theſe, ſtanding together in the Tables, are 119,4, and 80,5 under 34 Degrees, which is my Courſe.

Then with the Courſe 34°, and one Fourth of 852 the proper Dif. of Lat. 213, I find the neareſt Number to this is 213,1, ſtanding in Lat. Column; the Diſtance to which is 257, and being multiplied by 4, becauſe the Difference of Latitude was divided by 4, gives the Diſtance 1028.

Hence the direct Courſe is S. 34° W. or nearly S. W. by S. Diſtance 1028 Miles.

By Middle Latitude Sailing.

Difference of Longitude is reduced into Departure, by adding both Latitudes together as above, and taking Half their Sum for a Mean or Middle Latitude; this Middle Latitude ſubtracted from 90 Degrees, gives the Complement of Middle Latitude; with this Complement taken as a Courſe, and the Difference of Longitude as Diſtance, find the Departure as in Caſe I. in Plane Sailing.

Having the Departure and the proper Difference of Latitude, the Courſe is found as in Caſe VI. in Plane Sailing.

Thus, taking the Complement of Middle Latitude 45° 54′, or 46 Degrees, as a Courſe, and one Third of my Difference of Longitude 791, 264, as Diſtance, the Departure anſwering to theſe is 189,9, which multiplied by 3, gives 569,7, the Departure; then with one Fourth of the proper Difference of Latitude 852, and Departure 569,7, viz. 213, and 142,4, I ſeek in the Tables, and find the neareſt Numbers to theſe ſtanding together are 213,1, and 143,7, under 34 Degrees, againſt which, in the Diſtance Column, ſtands 257, this being multiplied by 4, gives 1028.

Hence the direct Courſe is S. 34° W. or nearly S. W. by S. Diſtance 1028 Miles, the ſame as before.

CASE II.

The Courſe and Differance of Latitude given, to find the Diſtance and Difference of Longitude.

EXAMPLE.

A Ship ſails from the Lizard, and makes her Courſe S. 39° W. or nearly S. W. by S. ½ W. and then by Obſervation is in Latitude 45° 31′ N. Required her Diſtance and Difference of Longitude?

By Mercator's Sailing.

	D. M.		
Lizard's Lat.	49 57 N.	Mer. Parts	3470
Lat. in	45 31 N.	Mer. Parts	3074
Diff. of Lat.	4 26	Mer.Dif.Lat.	396
	60		
Diff. in Miles	266		

Rule. With the Courſe among the Degrees, and the Difference of Latitude, found in the Column of Lat. find the Diſtance in its Column.

With the Courſe among the Degrees, and the Merid. Diff. of Latitude in the Lat. Column, the Difference of Longitude will be found in the Departure Column:

Thus, under the Courſe 39 Degrees, and againſt Half the Diff. of Lat. 133, ſtands 171 in the Diſtance Column, that doubled gives 342, the Diſtance. Under the ſame Degrees, I look in the Lat. Column for Half my Meridional Difference of Latitude 198, againſt that in the Column of Departure, ſtands, 160.5 doubled is 321, the Difference of Longitude.

	D. M.
Lizard's Long.	5 14 W.
Dif. of Long. 321, or	5 21 W.
Long. in	10 35 W.

By Middle Latitude Sailing.

		D. M.
Lizard's Lat.		49 57 N.
Lat. in		45 31 N.
Sum Latitudes	2)	95 28
Middle Lat.		47 44
		90 00
Com. Mid. Lat.		42 16

Rule. With the Courſe and proper Diff. of Lat find the Diſt. and Depart. in their Columns; then look for the Com. of Mid. Lat. among the Degrees, as if it was a Courſe, and your Departure in its Column, oppoſite to which, in the Diſt. Column, will be the Difference of Longitude:

Thus, under the Courſe 39°, and againſt Half my Diff. of Lat. 133, in its Column, ſtand Diſt. 171, and Dep. 107.6; theſe being doubled, give 342 for the Diſt. and 215.2 the Departure; then in the Dep. Column, under 42°, the Com. of Mid. Lat. I look for Half my Departure, the neareſt is 107.7; oppoſite to this, in the Diſt. Column, ſtands 161, which, being doubled, gives 322, the Difference of Longitude, nearly the ſame as before.

	D. M.
Longitude left,	5 14 W.
Diff. of Long. 322, or	5 22 W.
Long. in	10 36 W.

CASE III.

CASE III.

The Courſe and Diſtance given, to find the Difference of Latitude and Difference of Longitude.

EXAMPLE.

A Ship in Latitude 42° 30′ N. and Longitude 18° 31′ W. ſails S. W. by S. 591 Miles. What Latitude and Longitude is ſhe in?

By Mercator's Sailing.

Rule. With the Courſe found in the Table for Points, and Diſtance, find the Difference of Latitude, and Latitude in, and Meridional Difference of Latitude; with the Courſe, and Meridional Difference of Latitude, taken in the Column of Latitude, the correſponding Departure will be the Difference of Longitude.

Thus, under the Courſe 3 Points, and againſt one-Tenth of the Diſtance 59.1, in the Latitude Column, ſtands 49,1, this multiplied by 10, is 491, the Difference of Latitude. Then,

Lat. left	42 30 N.	Mer. Parts 2822
Diff. 491, or	8 11 S.	
Lat. in	34 19 N.	Mer. Parts 2194
		Mer. Diff. of Lat. 628

Now with one Fourth of this Meridional Difference of Latitude 157, found in the Column of Latitude for 3 Points, the Departure correſponding to it, is 105, which being multiplied by 4, is 420, the Difference of Longitude.

	D. M.
Long. left.	18 31 W.
Diff. of Long. 420, or	7 0 W.
Long. in	25 31 W.

Note. There being no Tenths in the Diſtances, the neareſt Number is here taken.

By Middle Latitude Sailing.

Rule. With the Courſe found among the Points, and Diſtance, find the Diff. of Lat. and Dep. then find the Lat. in, and Com. of Mid. Latitude; then find the Com. of Mid. Lat. in the Table for Degrees, and the Dep. in its Column, and the correſponding Diſtance will be the Difference of Longitude,

Thus, under the Courſe 3 Points, and againſt one Tenth of the Diſtance 59.1, ſtands Diff. of Lat. 49.1, and Dep. 32.8, Theſe being multiplied by 10, gives the Difference of Latitude 491, and Departure 328. Then,

Lat. left.	42 30 N.
Diff. of Lat. 491, or	8 11 S.
Lat. in	34 19 N.
Sum of Latitudes	2) 76 49
Mid. Lat.	38 24
	90 00
Com. Mid. Lat.	51 36

Now with Half the Dep. 164, I ſeek the neareſt Dep. to this over 51° and 52°, becauſe the Com. of Mid. Lat. is between 51° and 52°, the neareſt to which are 164 and 163.9, the Diſtances correſponding to theſe are 211 and 208, which being added together, gives 419, the Diff. of Lon.

Long. left	18 31 W.
Diff. of Long. 419, or	6 59 W.
Long. in	25 30 W.

CASE. IV.

Difference of Latitude and Departure given to find the Courſe, Diſtance, and Difference of Longitude.

EXAMPLE.

A Ship in Lat 49° 57′ N. and Long. 5° 14′ W. ſails S. Weſterly till her Departure from the Meridian be 789 Miles, and is then found by Obſervation to be in Lat. 39° 20′ N. Required the Courſe ſteered, Diſtance ſailed, and the Longitude ſhe is in ?

By Mercator's Sailing.

Lat. left	49	57 N.	Mer. Parts	3470
Lat. by Obſ.	39	20 N.	Mer. Parts	2571
Diff. of Lat.	10	37	Mer. Diff. Lat.	899
	60			
Diff. in Miles	637			

Rule. The Diff. of Lat. and Dep. being found ſtanding together, give the Courſe among the Degrees, and the Diſt. in its Column. In the Lat. Column belonging to the Degrees of the Courſe, find the Merid. Diff of Lat. oppoſite to that, in the Departure Column, will be the Difference of Longitude.

Now a ſixth Part of Diff. of Lat. 637, and of the Dep. 789, are 106.1 and 131.5; the neareſt to theſe are found over 51°, and the Diſtance 169, being multiplied by 6, is 1014 Miles.

In the Lat. Column, over the ſame Degrees, look for a 6th of the Mer. Diff. of Lat. 899, viz. 149.8; againſt that, in the Dep. Column, ſtands 185, which multiplied by 6, is 1110 Miles, the Diff. of Long. required.

	D.	M.
Then to Long. left.	5	14 W.
Add Diff. of Long. 1116, or	18	30 W.
Long. in	23	44 W.

By Middle Latitude Sailing.

Lat. left		49	57 N.
Lat. by Obſ.		39	20
Sum	2)	89	17
Mid. Lat.		44	38
		90	00
Com. Mid. Lat.		45	22

Rule. The Diff. of Lat. and Dep. being found together, will give the Courſe among the Degrees, and the Diſtance and Departure in their Columns.

With the Com. of Mid. Lat. among the Degrees, and the Dep. in its Column, find the Diff. of Long. among the Diſtances.

Now a Sixth of the Diff. of Lat. 637, and of the Dep. 789, are 106.1, and 131.5, the neareſt to theſe are found over 51°, and the Diſt. is 169, which multiplied by 6, gives 1014 Miles for the Diſt. Then, with the Com. of Mid. Lat. 45, taken as a Courſe, and a Sixth of the Dep. the Diſt. correſponding to theſe are 186, which being multiplied by 6, is 1116 Miles, the Diff. of Long.

	D.	M.
Now Long. left	5	14 W.
Diff of Long. 1116, or	18	36 W.
Long. in	23	50 W.

Hence the direct Courſe is 51° W. or nearly S. W. ½ W. Diſtance 1014 Miles.

I have

I have omitted the odd Minutes in the Complement of Middle Latitude, as the Longitude is found to a ſufficient Degree of Exactneſs without them; but thoſe who deſire to ſee a greater Degree of Accuracy, may ſatisfy themſelves by examining the laſt Edition of the PRACTICAL NAVIGATOR.

Theſe are all the Caſes that can well happen in a Day's Work at Sea; unleſs it ſo happens that a Ship's Courſe be due Eaſt or Weſt, in which Caſe the Departure is reduced into Longitude, by the following

Rule. With the Complement of the Latitude ſailed in, taken as a Courſe among the Degrees, and the Departure taken in its Column, the correſponding Diſtance will be the Difference of Longitude.

EXAMPLE.

Suppoſe a Ship in Latitude 49° 30′ North or South, ſails directly Eaſt or Weſt 136,4 Miles, what is her Difference of Longitude?

Now 49° 30′ ſubtracted from 90°, gives 40° 30′, the Complement of the Latitude; and as it lies between 41 and 40 Degrees, I look for my Departure under 40, and find the correſponding Diſtance 212, and under 41, the Diſtance is 208 Miles, which, added together, is 420; Half of this Sum is 210, the Difference of Longitude required.

How to work a Traverſe has been already ſhewn in Plane Sailing; but it is neceſſary here to ſhew how proper Allowances for Longitude are to be introduced into ſuch Accounts, which is eaſily done by the following Method.

Find the Difference of Latitude and Departure for each Courſe and Diſtance, and ſet them down in the Traverſe Table, as in Plane Sailing.

Find the whole Difference of Latitude and Departure, and with theſe find the Courſe and Diſtance made good, and the Latitude in, and Meridional Difference of Latitude, if you work by Mercator's Sailing, then with the Courſe and Meridional Difference of Latitude, find the Difference of Longitude.

But if you work by Middle Latitude Sailing, take the Complement of Middle Latitude, and, with that and the Departure, find the Difference of Longitude.

EXAMPLE.

Yeſterday at Noon we were in Latitude 38° 14′ N. Longitude 25° 56′ W. and have ſince run as per Log. the following Courſes and Diſtances, viz. N. E. by N. ¼ E. 56 Miles; N. N. W. 38; N. W. by W. 46; S. S. E. 30; S. by W. 20; and N. E. by N. 60 Miles. Required the Ship's Place, and her Direct Courſe and Diſtance made good?

		N.	S.	E.	W.
N. E. by N. ¼ E.	56	45,0		33,4	
N. N. W.	38	35,1			14,5
N. W. by W.	46	25,6			38,2
S. S. E.	30		27,7	11,5	
S. by W.	20		19,6		3,9
N. E, by N.	60	50,0		33,3	
		155,7 47,3	47,3	78,2 56,6	56,6
Diff. of Lat.		108,4	Dep.	21,6	

With the Difference of Latitude and Departure, the Courſe is found to be N. by E. and Diſtance 111 Miles.

By Mercator's Sailing.

	D. M.		
Lat. left	38 14 N.	Mer. Parts	2486
Diff. of Lat.	1 48 N.		
Lat. come to	40 2 N.	Mer. Parts	2625
		Mer. Diff. Lat.	139

Under the Courſe 1 Point, look in the Latitude Column for the Meridional Difference of Latitude, the neareſt is 139.3, oppoſite to that is Departure 27.7, which is the Difference of Longitude.

Long. left		25° 56′ W.
Diff. of Long,	27.7,	or 28 E.
Long. in		25 28

By Middle Latitude Sailing.

	D. M.
Lat. left	38 14 N.
Lat. in.	40 2
Sum Lat's,	78 16
Middle Lat.	39 8
	90 0
Com. Mid. Lat.	50 52

Over 51 Degrees, I look in the Departure Column for my Departure, the neareſt is 21.8, oppoſite that in the Diſt. Column, ſtands 28, which is my Difference of Longitude.

Hence it appears, that the Ship is in Latitude 40° 2′ N. and Longitude 25° 281 W. and has run S. by E. 111 Miles.

In like Manner may any Traverſe be worked, either by Middle Latitude or Mercator's Sailing.

The

The Uſe of the following Tables for finding the Moon's Age, and Time of High Water at any Place.

FIND the Moon's Age in the following Table, ſhewing the mean Times of her Changes, by reckoning the Number of Days ſince her laſt Change; and only obſerving, that the Day on which you find her Age is to be excluded; that is, you are only to count the Days that are completely elapſed ſince her laſt Change.

EXAMPLE I.

Required the Time it will be High Water at London, November the 12th, 1778?

In the Table of Changes, oppoſite to 1778, and under October, I find that it was New Moon the 20th, at 10 in the Morning, and by reckoning forward to November the 12th, find, that it is 23 Days ſince her laſt Change; then in the Table of Times, againſt 23, her Age, ſtand 5 H. 22 M. to which I add 2 H. 30 M. (the Time of High Water on Full and Change Days at London) gives 7 H. 52 M. ſo that it is High Water 52 Minutes after Seven in the Morning at London on the given Day.

Note. The Times of High Water, at full and Change, at any Place, are ſet before the Latitudes and Longitudes of theſe Places.

EXAMPLE II.

What Time will it be High Water at London, June the 25th, 1781?

Oppoſite to 1781, and under June, in the Table of Changes, I find it was New Moon the 21ſt Day, at 10 in the Morning; and, reckoning forward to June the 25th, find that ſhe is almoſt 4 Days old. In the Table of Times, againſt her Age, 4 Days, ſtand 2 Hours 28 Minutes, this added to 2 Hours, 30 Minutes, the Time of High Water at London, gives 4 Hours 58 Minutes, the Time of High Water at London, June 25th, 1781.

A TABLE,

Shewing the Times of the mean Changes of the Moon to the neareſt Hour, from the Beginning of the Year 1778, till the End of the Year 1799, according to the New Style. And alſo a Table of the Shifting of the Tides, by which will appear the Error in reckoning High Water to be ¾ of an Hour later every Day after Full and Change.

	Mean Changes.					
Year	Jan.	Feb.	March.	April	May.	June
	D. H.	D. H.	D. H.	D. H.	D. H.	D. H.
1778	28. 3m.	26. 4 a	28 5m	26. 6 a	26. 6m	24. 7 a
1779	17. 0 a	16. 1m	17. 2 a	16. 3m	15 3 a	14. 4m
1780	6. 9 a	5. 10m	5. 11 a	4. 11m	3. 12 a	2. 0 a
1781	24. 6 a	25. 7m	24 8 a	23. 9m	22. 9 a	21. 10m
1782	14. 3m	12. 4 a	14 5m	12. 6 a	12. 6m	10. 7 a
1783	3. 0 a	2. 1m	3. 2 a	2. 2m	1. 3 a 31 3m	29. 4 a
1784	22. 9m	20. 10 a	21. 11 a	19 12 a	19. 0 a	18. 1m
1785	10. 6 a	9. 7 m	10. 8 a	9 9 m	8. 10 a	7. 10m
1786	29. 4 a	28. 5 m	29. 5 a	28. 6m	27. 6 a	26. 7m
1787	18. 12 a	17. 1 a	12. 2m	17. 3 a	17. 3m	15. 4 a
1788	8. 0m	6. 10a	7 11m	5 12 a	5. 1 a	4. 1m
1789	26. 7m	24. 8 a	26. 9m	24. 10 a	24. 10m	22. 11 a
1790	15. 4 a	14 3m	15. 5 a	14. 6m	13. 6 a	12. 7m
1791	4. 12 a	3. 1 a	5. 2m	3. 3 a	3. 4m	1. 4 a 31. 5m
1792	23. 10 a	22. 11m	22. 12 a	21. 1 a	21. 1m	19. 2 a
1793	12. 7m	10. 8 a	12. 9 m	10. 10 a	10. 10m	8. 11 a
1794	1. 4 a 31. 5m.		1. 6 a 31. 6m	29. 7 a	29. 7m	27. 8 a
1795	20. 1 a	19 2m	20. 3 a	10. 4m	18. 4m	17. 5m
1796	9. 10a	8. 11m	8. 12 a	7. 0 a	7. 1m	5. 1 a
1797	21. 7 a	26. 8m	27. 9 a	26. 10m	25. 10 a	24. 11m
1798	17. 4m	15. 8m	17. 6m	15. 7 a	15. 7m	13. 8 a
1799	6. 1 a	5. 2m	6. 3 a	5. 4m	4. 5 a	3. 5m

Moon's Age	High Water later than Full and Change each Day.		
Days.	H.	M.	
1	0	44	Afternoon.
2	1	22	
3	1	56	
4	2	28	
5	3	2	
6	3	40	
7	4	24	
8	5	12	
9	6	4	
10	7	4	
11	8	8	
12	9	12	
13	10	15	
14	11	16	
15	12	12	

After Change the Moon comes to the Meridian in the Afternoon.

To find the Time of High Water. Firſt, find the Moon's Age in the firſt Table, by counting the Days ſince her laſt Change, and againſt her Age, in the ſecond Table, ſtand Hours and Minutes, to which add the Time making High Water at Full and Change at that Place, and you will find the Time of High Water any Day there.

A TABLE,

Shewing the Times of the mean Changes of the Moon to the neareſt Hour, from the Beginning of the Year 1778, till the End of the Year 1799, according to the New Style. And alſo a Table of the Shifting of the Tides, by which will appear the Error in reckoning High Water to be ¾ of an Hour later every Day after Full and Change.

Mean Changes.						
Year	July	Aug	Sept.	October.	Novem.	Decem.
	D. H.	D. H.	D. H.	D. H.	D. H.	D. H.
1778	24. 8m.	22. 9 a	21. 9m	20. 10m	19. 11m	18. 12 a
1779	13. 5 a	12. 6m	10. 6 a	10. 7m	8. 8 a	8. 9m
1780	2. 1m 31. 2 a	30. 3m	28. 3 a	28. 4m	26. 5 a	26. 6m
1781	20. 11 a	19. 0 a	17 12 a	17. 1 a	16. 2m	15. 3 a
1782	10. 8m	8 9 a	7. 9m	6 10 a	5. 11m	4. 12 a
1783	29. 5m	27. 6 a	26. 6m	25. 7 a	24. 8m	23. 9 a
1784	17 2 a	16 3m	14. 3 a	14 4m	12. 5 a	12. 6m
1785	6 11 a	5. 0 a	4. 1m	3. 1 a	2. 2m	1. 3 a 31. 3m
1786	15. 8 a	24. 9m	22. 9 a	22. 10m	20. 11 a	20. 0
1787	15. 5m	13. 6 a	12. 6m	11. 7 a	10. 8m	9. 9 a
1788	3 2 a	2. 3m 31. 4 a	30. 4m	29. 5 a	28. 6m	27. 7 a
1789	22. 0 a	21. 1m	19. 1 a	19. 2m	17. 3 a	17. 4m
1790	11. 8 a	10. 9m	8. 9 a	8. 10m	6. 11 a	6. 0 a
1791	30. 6 a	29. 7m	27. 7 a	27. 8m	25. 9 a	25. 10m
1792	19. 3m	17 4 a	16. 4m	15. 5 a	14. 6m	13. 7 a
1793	8. 0 a	7 1m	5. 1 a	5. 2m	3. 3 a	3. 4m
1794	27. 9m	25. 10 a	24. 10m	23. 11 a	22. 0 a	22. 1m
1795	16. 6 a	15. 7m	13. 7 a	13 8m.	11. 9 a	11. 10m
1796	5. 2m	3. 3 a	2. 4m	1. 4 a 31. 5m	29. 6 a	29. 7m
1797	23. 12 a	22. 1 a	21. 1m	20. 2 a	19. 3m	18. 4 a
1798	13. 9m	11. 10 a	10 10m	9. 11 a	8. 0 a	8. 1m
1799	2. 6 a	1. 7m 30. 8 a	29. 8m	28. 9 a	27. 10m	26. 11 a

Moon's Age.	Times Anſw.	
	High Water later after Full and Change each Day.	
Days.	H.	M.
16	0	56
17	1	24
18	2	8
19	2	40
20	3	14
21	3	52
22	4	36
23	5	22
24	6	16
25	7	18
26	8	22
27	9	26
28	10	30
29	11	32
29½	12	12

After Midnight

After Full Moon ſhe comes to the Meridian after Midnight.

Note, *a* ſtands for Afternoon, and *m* for Morning.

In ſome Places it is High Water on the Shore while the Tide continues to flow in the Stream or Offing. If it runs 3 Hours longer, it is called Tide and Half Tide; an Hour and an Half makes Tide and Quarter Tide; Three Quarters of an Hour makes Tide and Half Quarter Tide, &c.

EXAMPLE.

EXAMPLE III.

At what Time will it be High Water at St. Helen's, March the 7th, 1779?

Againſt 1779, and under February, I find it is new Moon the 16th, at 1 in the Morning, and reckoning on to March the 7th, gives 19 Days for the Moon's Age; oppoſite to that, in the Table of Times, ſtand 2 Hours 40 Minutes; this being added to 9 Hours, the Time of High Water at Full and Change at St. Helen's, gives 11 Hours 40 Minutes, for the Time paſt Midnight, when it is High Water there.

In like Manner, may the Time of High Water be found at any other Place. Whoever will compare theſe Examples with the Methods uſed in other Books of this Kind, will find a conſiderable Difference, as they frequently give the Moon's Age ſeveral Days, and of High Water, Hours wide of the Truth; indeed, on Account of the Irregularities in the Moon's Motion, the Times of her Change may differ Half a Day from the Truth, and the Time of High Water 30 Minutes, but ſeldom more, if the Sea is not greatly influenced by the Wind.

The Table of Times of the Shifting of the Tides will alſo ſhew the Error of reckoning High Water to be Three Quarters of an Hour later ever Day; for the mean Period of the Moon, from Change to Change, is 29 Days, 12 Hours, 44 Minutes; in which Time, the Tides make a Period through the 24 Hours, making High Water later each Day, as in the Table of Times, the mean Time from Tide to Tide being about 12 Hours 24 Minutes.

As the Nautical Almanac is become now of general Uſe in long Voyages, the Time of High Water, at any Part of the World, may be readily found, if the Time making High Water at Full and Change be known; for in the ſixth Page of each Month is given the Time of the Moon's Paſſage over the Meridian of Greenwich every Day: This Time may be reduced to the Meridian of any other Place, by allowing 1 Hour for every 15 Degrees of Longitude. To this Time add the Time making High Water there, on Full and Change Days, will give the Time of High Water on that Day, if the Sum be leſs than 12 Hours; but if above, ſubtract 12 Hours 24 Minutes. or 24 Hours 49 Minutes from it: Obſerving, that the Days in this Almanac begin 12 Hours ſooner than the common Day.

Among Pilots it is cuſtomary to reckon the Time of Flood, or High Water, by the Point of the Compaſs the Moon bears on at that Time, allowing three Quarters of an Hour for each Point. Thus, in Places where it is Flood at Noon on the Days of Full and Change, the Tide is ſaid to flow North and South, or at 12 o'Clock. In Places where the Moon bears 1, 2, 3, 4, or more Points to the Eaſt or Weſt of the Meridian, when it is High Water on the ſame Days, the Tide is ſaid to flow on ſuch a Point, ſo if the Moon bears S. E. at Flood, it is ſaid to flow S. E. and N. W. or 3 Hours before the Meridian, that is, 9 o'Clock; if ſhe bears S. W. it flows S. W. and N. E. or at 3 Hours after the Meridian; and in like Manner for other Points of the Moon's bearing, as in the following Table:

A TABLE *of the Bearings of the* MOON *at the Time of High Water, with the Time of thoſe Bearings at the following Places:*

When the Moon bears as follows.		H.	
N. and	S.	12	Iſle of Alderney, Gibraltar, Southampton, Beachy, Sheerneſs, a Sand called Kentiſh Knock, a Sand called the Swin, at the Mouth of the Thames.
N. by E.	S. by W.	0¾	or 45 Minutes paſt 12, Rocheſter, Fluſhing, Malden, Nore.
N. N. E.	S. S. W.	1½	or 30 Minutes paſt 1, Bell Iſle, Tinmouth, Graveſend, Holyhead.
N. E. by N.	S. W. by S	2¼	or 15 Minutes paſt 2, Berwick, Liſbon, St. Andrew's, Conquet.
N. E.	S. W.	3	Whitby, London, Amſterdam, Bourdeaux, Bay of Biſcay.
N. E. by E.	S.W. by W	3¾	Breſt, Huntcliff, Iſle of Bas at the Maes, Scarborough.
E. N. E.	W. S. W.	4½	In Breeſound, Uſhant, Scilly, Cork, C. Clear.
E. by N.	W. by S.	5¼	Humber Mouth, at the Spurn, Torbay, Start, Point.
E.	W.	6	Hull, Wells, Weymouth, Plymouth, Ramehead.
E. by S.	W. by N.	6¾	Briſtol, Portland Road, Lynn, Foulneſs, Foy,
E. S. E.	W. N. W.	7½	Lizard, Land's End, Falmouth, Penryn, C. Barfleur.
S. E. by E.	N.W. by W.	8¼	Eddiſtone, Yarmouth, Needles, Fly, Dublin, I. Ely.
S. E.	N. W.	9	Iſle of Man, Iſle of Wight, E. End, Caſkets Caen, St. Helen's.
S. E. by S.	N.W. by N.	9¾	N. Foreland, Dungeneſs, Dunnoſe, Shoreham
S. S. E.	N. N. W.	10½	Downs, Deal, Dover, S. Foreland
S. by E.	N. by W.	11¼	Margate, Harwich, Roſe, Pool, Portſmouth, Spithead, Calais.
S.	N.	12	Dunkirk, Embden, R. Elbe, Coaſt of Flanders, Oſtend.

Note. The Current in the Downs generally runs 7¼ Hours to the North; and 5¼ Hours to the Southward; at Dover the Tide from the Channel runs Northward 7¼ Hours; and from the North 5 H. 10 M. at the Full and Change of the Moon. The Tides ſet in the Downs N. N. E. and S. S. W. nearly.

To work an Obſervation, or to find the Latitude of a Place by the Tables of the Sun or Star's Declination and the Zenith Diſtance.

The Latitude of any Place is its Diſtance from the Equator, either North or South, counted in Degrees, &c. upon an Arch of the Meridian, contained between the Zenith or that Point directly over your Head and the Equator. It can never exceed 90 Degrees, and is found by taking the Altitude or Height of the Sun or Star above the Horizon of the Sea with a Quadrant, when on the Meridian or due North or South of the Place of Obſervation.

This Meridian Altitude corrected for Dip of the Horizon, and Refraction, and 16 Minutes the Sun's Semidiameter added thereto, gives the Altitude of his Centre, which being ſubtracted from 90° gives the Zenith Diſtance, or the Number of Degrees, &c. the Centre of the Object is from the Point over your Head; with which, and knowing how far the Object is to the North or South of the Equator, which is called Declination, the Latitude is found by the Meridian Altitude of any Celeſtial Object as follows:

1ſt. If the Sun or Star be South when obſerved, call the Zenith Diſtance South; but if North, call it North.

Then if the Zenith Diſtance and Declination be of contrary Names, that is, if the Sun or Star comes to the Meridian in the North, and hath South Declination, or to the South, and hath North Declination, the Zenith Diſtance, added to the Declination, gives the Latitude of the Place of Obſervation; and of the ſame Name the Declination is of, whether North or South.

2dly. When the Zenith Diſtance and Declination are of the ſame Name, that is, when the Sun or Star comes to the Meridian in the North, and hath North Declination, or to the South, and hath South Declination, ſubtract the Leſs from the Greater, and the Remainder is the Latitude; and to know whether it is North or South obſerve this general Rule.

When the Declination is greater than the Zenith Diſtance, the Latitude is of the ſame Name with the Declination; but if leſs, of a contrary Name.

NOTE 1ſt. When the Sun or Star is upon the Equator, or hath no Declination, the Zenith Diſtance is the Latitude of the Place, and of a contrary Name to the Zenith Diſtance.

2dly. When the Sun or Star is in the Zenith, the Declination is the Latitude, and of the ſame Name as the Declination is of: For it is evident, that as they are equally diſtant from the Equator, and on the ſame Side of it, conſequently, if the Declination be North, the Latitude will be alſo North, and if South, South.

3dly. When the Altitude of the Sun's lower Limb is taken by a Back Obſervation, the Sun's Semidiameter muſt be ſubtracted from the Obſerved Altitude.

EXAMPLE.

EXAMPLE I.

Being at Sea the 27th of May, 1782, the Sun's Meridional Alt. was ſound to be 57° 35′, and it was South of me; what Latitude was I in?

	90°	00′
Meridional Altitude	57	35 N.
Zenith Diſtance	32	25 S.
Sun's Decl. in Table for May 27 is	21	21 N.
Latitude in	53	46 N.

EXAMPLE II.

Being at Sea the 24th of July, 1786, the Meridian Altitude of the Sun was 27° 13′, being North of me; required the Latitude in?

	90°	00′
Meridian Altitude	27	13 N.
Zenith Diſtance	62	47 N.
Sun's Decl. in Table for July 24th	19	51 N.
Latitude in	42	56 S.

EXAMPLE III.

Being at Sea 14th of December, 1782, the Sun's Meridian Altitude was found 72° 17′ N. What was the Latitude of the Place of Obſervation?

	90°	00′
Meridian Altitude	72	17 N.
Zenith Diſtance	18	43 N.
Declination	23	16 S.
The Latitude in	4	33 N.

In this Caſe it is plain, that the Obſerver was between the Sun and the Equator.

EXAMPLE IV.

Being at Sea the 4th of May, 1782, I obſerved the bright Star Fomelhaut 27° 21′ above the Horizon of the Sea, and it was North of me; required the Latitude in?

	90°	00′
Meridian Altitude	27	21
Zenith Diſtance	52	39 N.
Fomelhaut's Declin.	30	46 S.
The Latitude in	21	53 S.

The foregoing Rules are for obſerving by the Sun or Stars when they are at their greateſt Altitude, or upon the Meridian above the Pole; but as in ſome Parts of the Earth the Sun does not ſet for ſeveral Days, and ſome Stars never ſet, in that Caſe they may be obſerved upon the Meridian twice in twenty-four Hours, that is, once at their greateſt Height as before, and again when they are at the loweſt; or upon the Meridian below the Pole, to work which Obſervations take the following

Rule. Add the Complement of the Declination to the Meridian Altitude, the Sum is the Latitude of the ſame Name with the Declination.

EXAMPLE V.

At Sea I took the Altitude of the North Pole Star, when on the Meridian below the Pole, and found it 46° 21′, required the Latitude?

The

The Meridian-Altitude		46° 21′ N.
Com. Declination	—	1 54
The Latitude in	—	48 15 N.

In the following Examples the Corrections for Dip and Refraction are introduced.

EXAMPLE VI.

By a fore Obſervation the Altitude of the Sun's lower Edge was found by Hadley's Quadrant to be 40° 20′ S. when his Declination was 9° 56′ N. the Eye being 30 Feet above the Horizon.

Required the Latitude of the Plane?

Obſ. Alt. Sun's lower Edge	40°	20′ S.
Semidiam. to be added	0	16
App. Alt. Sun's Centre	40	36
Dip of Hor. to be ſubtr.	0	05
App. Alt. Cor. by the Dip	40	31
Refract. to be ſubtr.	0	01
True Alt. of Sun's Centre	40	30
True Zenith Diſtance	49	30 S.
Declination	9	56N.
Latitude	59	26N.

EXAMPLE VII.

By a back Obſervation with Hadley's Quadrant, the apparent Altitude of the Sun's lower Edge was 25° 12′ S. when his Declination was 21° 14′ S. and the Eye 40 Feet above the Horizon. In what Latitude was the Obſervation made?

Obſ. Alt. Sun's low. Edge	25°	12′ S.
Semidiam. to be ſubtr.	0	16
App. Alt. Sun's Centre	24	56
Dip of Hor. to be added	0	06
App. Alt. Cor. by the Dip	25	02
Refract. to be ſubtr.	0	02
True Alt. of Sun's Centre	25	00
True Zenith Diſtance	65	00 S.
Declination	21	14 S.
Latitude	43	46 N.

EXAMPLE VIII.

Suppoſe the Eye of an Obſerver at 35 Feet above the Water, ſhould by a fore Obſervation, find the Altitude of Sirius 53° 35′ S. when it paſſed the Meridian, having ſet his Watch, and found the Time of Sirius's Paſſage? required the Latitude of the Place;

Obſ. Alt. of Sirius	53°	35′	00″N
Dip of Hor to be ſub.	00	5	39
Ap. Alt. above Hor.	53	26	21
Refract. to be ſub.	0	00	42
True Alt. of Sirius	53	28	39
True Zenith Diſt.	36	31	21 S.
Sirius's Declination	16	25	5 S.
Latitude	20	06	16N.

EXAMPLE IX.

Suppoſe on the 12th of June, 1780, an Obſerver in an high Northern Latitude, his Eye being 28 Feet high, obſerved the Altitude of the Sun's lower Limb on the Meridian below the Pole, to be 8° 15′ North by a fore Obſervation; required the Latitude?

App. Alt. Sun's lower Limb	8°	15′N
Semidiam. added		16
App. Alt. Sun's Centre	8	31
Dip of Hor. ſub.		5
Sun's Alt. Cor. by Dip	8	26
Refract. ſub.		6
True Alt. Sun's Centre	8	20
Comp. Sun's Decl.	66	47
Latitude in	75	7N.

A Table of the Refraction of the Heavenly Bodies, to be ſubtracted from the obſerved Altitude.

Elevation of the Eye above Sea in Feet.	Dip of the Hor. of the Sea.	App. Alt.	Retrac.	App. Alt.	Refrac.	App. Alt.	Refr	App. Alt.	Refr	App. Alt.	Refr
	′ ″	° ″	′ ″	° ′	′ ″	° ″	′ ″	° ″	′ ″	° ″	″ ′
1	0 57	0	33 0	4 50	10 11	10 30	5 0	26 0	1 56	59 0	0 34
2	1 21	5	32 10	5 0	9 54	10 45	4 53	27	1 51	60	33
3	1 39	10	31 22	5 10	9 38	11 0	4 47	28	1 41	61	32
4	1 55	15	30 35	5 20	9 23	11 15	4 40	29	1 42	62	30
5	2 08	20	29 50	5 30	9 8	11 30	4 34	30	1 38	63	29
6	2 20	30	28 22	5 40	8 54	11 45	4 29	31	1 35	64	28
7	2 31	32	28 5	5 50	8 41	12 0	4 23	32	1 31	65	26
8	2 42	36	27 30	6 0	8 28	12 20	4 16	33	1 28	66	25
9	2 52	40	27 0	6 10	8 15	12 40	4 9	34	1 24	67	24
10	3 1	50	25 42	6 20	8 3	13 0	4 3	35	1 21	68	23
12	3 18	1 0	24 29	6 30	7 51	13 20	3 57	36	1 28	69	22
14	3 34	1 10	23 20	6 40	7 40	13 40	3 51	37	1 16	70	21
16	3 49	1 20	22 15	6 50	7 30	14 0	3 45	38	1 13	71	19
18	4 3	1 30	21 15	7 0	7 20	14 20	3 40	39	1 10	72	18
20	4 16	1 40	20 18	7 10	7 11	14 40	3 35	40	1 8	73	17
22	4 28	1 50	19 25	7 20	7 2	15 0	3 30	41	1 5	74	16
24	4 40	2 0	18 35	7 30	6 53	15 30	3 24	42	1 3	75	15
26	4 52	2 10	17 48	7 40	6 45	16 0	3 17	43	1 1	76	14
28	5 3	2 20	17 4	7 50	6 37	16 30	3 10	44	59	77	13
30	5 14	2 30	16 24	8 0	6 29	17 0	3 4	45	57	78	12
35	5 39	2 40	15 45	8 10	6 22	17 30	2 59	46	55	79	11
40	6 2	2 50	15 9	8 20	6 15	18 0	2 54	47	53	80	10
45	6 24	3 0	14 36	8 30	6 8	18 30	2 49	48	51	81	9
50	6 44	3 10	14 4	8 40	6 1	19 0	2 44	49	49	82	8
60	7 23	3 20	13 34	8 50	5 55	19 30	2 39	50	48	83	7
70	7 59	3 30	13 6	9 0	5 48	20 0	2 35	51	46	84	6
80	8 32	3 40	12 40	9 10	5 42	20 30	2 31	52	44	85	5
90	9 3	3 50	12 15	9 20	5 36	21 0	2 27	53	43	86	4
100	9 33	4 0	11 51	9 30	5 31	21 30	2 24	54	41	87	3
		4 10	11 29	9 40	5 25	22 0	2 20	55	40	88	2
		4 20	11 8	9 50	5 20	23 0	2 14	56	38	89	1
		4 30	10 48	10 0	5 15	24 0	2 7	57	37	90	0
		4 40	10 29	10 15	5 7	25 0	2 2	58	35		

A TABLE

A TABLE of AMPLITUDES.

DEGREES of DECLINATION.

Lat.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	29	21	22	23	3.29	Lat.
	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D· M	D M	
1	1.00	2. 0	3. 0	4. 0	5. 0	6. 0	7. 0	8. 0	9. 0	10. 0	11. 0	12. 0	13. 0	14. 0	15. 0	16. 0	17. 0	18. 0	19. 0	20. 0	21. 0	22. 0	23. 0	23.29	1
2	1.00	2. 0	3. 0	4. 0	5. 0	6. 0	7. 0	8. 0	9. 0	10. 0	11. 0	12. 0	13. 0	14. 0	15. 0	16. 1	17. 1	18. 1	19. 1	20. 1	21. 1	22. 1	23. 1	23.30	2
3	1.00	2. 0	3. 0	4. 0	5. 0	6. 0	7. 1	8. 1	9. 1	10. 1	11. 1	12. 1	13. 1	14. 1	15. 1	16. 1	17. 1	18. 1	19. 1	20. 2	21. 2	22. 2	23. 2	23.31	3
4	1.00	2. 0	3. 0	4. 0	5. 0	6. 1	7. 1	8. 1	9. 1	10. 1	11. 2	12. 1	13. 2	14. 2	15. 2	16. 2	17. 2	18. 2	19. 3	20. 3	21. 3	22. 3	23. 3	23.33	4
5	1.00	2. 0	3. 0	4. 1	5. 1	6. 1	7. 2	8. 2	9. 2	10. 2	11. 3	12. 3	13. 3	14. 3	15. 4	16. 4	17. 4	18. 4	19. 4	20. 5	21. 5	22. 5	23. 5	23.35	5
6	1.00	2. 0	3. 1	4. 1	5. 1	6. 2	7. 2	8. 2	9. 3	10. 3	11. 3	12. 4	13. 4	14. 4	15. 5	16. 5	17. 5	18. 6	19. 6	20. 7	21. 7	22. 7	23. 8	23.38	6
7	1. 0	2. 1	3. 1	4. 2	5. 2	6. 2	7. 3	8. 3	9. 4	10. 4	11. 5	12. 5	13. 6	14. 6	15. 7	16 7	17. 8	18. 8	19.09	20.09	21.10	22.10	23.11	23.40	7
8	1. 0	2. 1	3. 1	4. 2	5. 3	6. 3	7. 4	8. 4	9. 5	10. 5	11. 6	12. 7	13. 8	14. 8	15. 9	16 10	17.10	18.11	19.11	20.12	21.13	22.13	23.14	23.44	8
9	1. 0	2. 1	3. 2	4. 3	5. 3	6. 4	7. 5	8. 6	9. 7	10. 7	11. 8	12. 9	13.10	14.10	15.11	16 12	17.13	18.14	19.15	20.16	21.17	22.17	23.18	23.49	9
10	1. 1	2. 2	3. 3	4. 4	5. 5	6. 6	7. 7	8. 8	9. 9	10.10	11.11	12.12	13.13	14.14	15.15	16 16	17.17	18.18	19.19	20.20	21.21	22.22	23.23	23.54	10
11	1. 1	2. 2	3. 3	4. 4	5. 5	6. 6	7. 7	8. 9	9.10	10.11	11.11	12.13	13.15	14.16	15.17	16 18	17.20	18.21	19.22	20.24	21.25	22.26	23.28	23.58	11
12	1. 1	2. 3	3. 4	4. 5	5. 7	6. 8	7. 9	8.11	9.12	10.13	11.15	12.19	13.18	14.19	15.21	16 22	17.23	18.25	19.26	20.28	21.29	22.31	23.33	24.03	12
13	1. 2	2. 3	3. 5	4. 6	5. 8	6.10	7.11	8.12	9.14	10.15	11.17	12.19	13.21	14.22	15.24	16.26	17.28	18.30	19.31	20.33	21.35	22.37	23.38	24.08	13
14	1. 2	2. 3	3. 5	4. 7	5. 9	6.11	7.13	8.15	9.17	10.18	11.20	12.22	13.24	14.26	15.28	16.30	17.32	18.34	19.36	20.38	21.41	22.43	23.45	24.15	14
15	1. 2	2. 4	3. 6	4. 8	5.11	6.13	7.15	8.17	9.19	10.21	11.23	12.25	13.28	14.30	15.32	16.35	17.37	18.40	19.42	20.44	21.46	22.49	23.51	24.22	15
16	1. 2	2. 5	3. 7	4.10	5.12	6.1	7.17	8.19	9.22	10.24	11.27	12.29	13.32	14.34	15.37	16.40	17.42	18.45	19.48	20.51	21.53	22.56	23.59	24.29	16
17	1. 2	2. 5	3. 8	4.11	5.13	6.16	7.19	8.2	9.25	10.27	11.30	12.33	13.36	14.39	15.42	16.45	17.48	18.51	19.54	20.57	22.00	23.04	24.07	24.38	17
18	1. 2	2. 6	3. 9	4.12	5.15	6.19	7 12	8.25	9.28	10.30	11.34	12.38	13.41	14.44	15.46	16.51	17.54	18.57	20.01	21.05	22.08	23.12	24.15	24.46	18
19	1. 3	2. 7	3.10	4.13	5.17	6.21	7.24	8.28	9.31	10.34	11.38	12.42	13.47	14.50	15.53	16.57	18. 1	19. 5	20. 8	21.12	22.16	23.20	24.24	25.56	19
20	1. 4	2. 8	3.12	4.15	5.19	6.23	7.27	8.31	9.35	10.38	11.43	12.47	13.51	14.55	16. 0	17. 4	18. 8	19.12	20.16	21.20	22.25	23.29	24.34	25. 5	20
21	1. 4	2. 8	3.13	4.17	5.21	6.26	7.30	8.34	9.39	10.43	11.48	12.52	13.57	15. 1	16. 5	17.10	18.15	19.20	20.24	21.29	22.34	23.39	24.44	25.16	21
22	1. 4	2. 9	3.14	4.19	5.23	6.28	7.33	8.38	9.43	10.47	11.53	12.58	14. 3	15. 8	16.13	17.18	18.23	19.28	20.33	21.39	22.44	23.50	24.55	25.27	22
23	1. 5	2.10	3.15	4.21	5.26	6.31	7.36	8.42	9.47	10.52	11.58	13. 3	14. 9	15.14	16.19	17.25	18.31	19.37	20.43	21.49	22.55	24. 1	25. 7	25.39	23
24	1. 5	2.11	3.17	4.23	5.28	6.34	7.40	8.45	9.51	10.57	12. 3	13. 9	14.17	15.21	16.27	17.34	18.40	19.46	20.52	21.59	23. 6	24.12	25.19	25.51	24
25	1. 6	2.12	3.18	4.25	5.31	6.37	7.43	8.50	9.56	11. 2	12. 9	13.16	14.23	15.29	16.35	17.42	18.49	19.56	21. 3	22.10	23.18	24.24	25.32	26. 5	25
26	1. 7	2.13	3.20	4.27	5.33	6.41	7.58	8.54	10. 1	11. 8	12.15	13.23	14.30	15.37	16.44	17.51	18.59	20. 6	21.14	22.22	23.30	24.38	25.46	26.19	26
27	1. 7	2.14	3.22	4.29	5.36	6.44	7.51	8.59	10. 6	11.14	12.22	13.30	14.38	15.45	16.53	18. 1	19. 9	20.17	21.26	22.34	23.43	24.51	26. 0	26.34	27
28	1. 8	2.16	3.24	4.32	5.40	6.48	7.56	9. 4	10.12	11.20	12.29	13.37	14.46	15.54	17. 3	18.11	19.20	20.29	21.38	22.48	24.57	25. 6	26.16	26.49	28
29	1. 8	2.17	3.25	4.34	5.43	6.52	8. 0	9. 9	10.18	11.27	12.36	13.45	14.54	16. 3	17.12	18.22	19.31	20.41	21.51	23. 1	24.11	25.22	26.32	27. 6	29
30	1. 9	2.18	3.28	4.37	5.46	6.56	8. 5	9.15	10.24	11.33	12.43	13.53	15. 3	16.13	17.22	18.33	19.43	20.54	22. 5	23.16	24.27	25.38	26.49	27.23	30
31	1.10	2.20	3.30	4.40	5.50	7. 0	8.10	9.21	10.31	11.41	12.52	14. 2	15.13	16.23	17.34	18.45	19.56	21. 8	22.19	23.31	24.43	25.55	27. 7	27.42	31
32	1.10	2.21	3.33	4.42	5.54	7. 5	8.16	9.27	10.38	11.49	13. 0	14.11	15.23	16.34	17.46	18.58	20.10	21.22	22.34	23.47	25. 0	26.13	27.26	28. 1	32
33	1.11	2.23	3.35	4.46	5.58	7. 9	8.20	9.33	10.45	11.57	13. 9	14.21	15.33	16.45	17.58	19.11	20.24	21.37	22.50	24. 4	25.18	26.32	27.46	28.23	33

A TABLE of AMPLITUDES.

DECLINATION in DEGREES.

Lat.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23.29	Lat.
	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	D M	
34	1.12	2.25	3.37	4.50	6. 2	7.15	8.27	9.39	10.52	12. 5	13.18	14.31	15.44	16.57	18.11	19.25	20.39	21.53	23. 7	24.21	25.36	26.51	28. 7	28.44	34
35	1.13	2.27	3.40	4.53	6. 6	7.20	8.33	9.47	11. 0	12.14	13.28	14.42	15.55	17.11	18.25	19.40	20.55	22.10	23.25	24.10	25.56	27.13	28.29	29. 7	35
36	1.14	2.28	3.43	4.57	6.11	7.25	8.39	9.54	11. 9	12.23	13.38	14.53	16. 9	17.24	18.39	19.55	21.11	22.27	23.43	25. 0	26.18	27.35	28.53	29.30	36
37	1.15	2.30	3.45	5. 0	6. 5	7.31	8.46	10. 2	11.17	12.33	13.49	15. 5	16.21	17.38	18.54	20.11	21.28	22.46	24. 3	25.21	26.39	27.58	29.17	29.56	37
38	1.16	2.32	3.48	5. 5	6.21	7.37	8.54	10.11	11.27	12.44	14. 1	15.18	16.35	17.55	19.10	20.28	21.46	23. 5	24.24	25.43	27. 3	28.23	29.43	30.23	38
39	1.17	2.34	3.51	5. 8	6.26	7.43	9. 1	10.19	11.37	12.54	14.12	15.31	16.49	18. 8	19.27	20.46	22. 6	23.26	24.46	26. 6	27.27	28.49	30.11	30.51	39
40	1.18	2.36	3.55	5.13	6.32	7.50	9. 9	10.28	11.47	13. 6	14.25	15.45	17. 5	18.24	19.44	21. 5	22.26	23.47	25. 9	26.31	27.53	29.16	30.40	31.22	40
41	1.19	2.39	3.58	5.18	6.38	7.57	9.17	10.37	11.57	13.18	14.39	16. 0	17.21	18.42	20. 4	21.26	22.48	24.10	25.33	26.56	28.21	29.46	31.11	31.53	41
42	1.21	2.41	4. 2	5.23	6.44	8. 5	9.26	10.47	12. 9	13.31	14.53	16.15	17.37	19. 0	20.23	21.46	23.10	24.34	25.58	27.24	28.50	30.16	31.43	32.26	42
43	1.22	2.44	4. 6	5.28	6.51	8.13	9.35	10.58	12.21	13.44	15. 7	16.31	17.55	19.19	20.43	22. 8	23.34	24.59	26.25	27.53	29.20	30.48	32.16	33. 0	43
44	1.23	2.47	4.10	5.34	6.58	8.21	9.45	11. 9	12.34	13.58	15.23	16.48	18.13	19.39	21. 5	22.32	23.59	25.26	26.54	28.23	29.53	31.22	32.51	33.37	44
45	1.25	2.50	4.15	5.40	7. 5	8.30	9.56	11.21	12.47	14.13	15.38	17. 6	18.33	20. 0	21.28	22.56	24.25	25.54	27.25	28.56	30.27	31.58	33.30	34.16	45
46	1.26	2.53	4.19	5.46	7.12	8.39	10. 6	11.34	13. 1	14.28	15.56	17.25	18.54	20.23	21.52	23.23	24.53	26.25	27.58	29.31	31. 3	32.37	34.12	35. 0	46
77	1.28	2.56	4.24	5.52	7.20	8.49	10.18	11.47	13.16	14.44	16.15	17.45	19.16	20.47	22.18	23.50	25.23	26.57	28.32	30. 7	31.42	33.18	34.56	35.46	47
48	1.29	2.59	4.29	5.59	7.29	8.59	10.30	12. 0	13.31	15. 2	16.34	18. 6	19.39	21.12	22.45	24.40	25.55	27.31	29. 7	30.45	32.23	34. 3	35.43	36.35	48
49	1.31	3. 3	4.34	6. 6	7.38	9.10	10.42	12.14	13.47	15.21	16.54	18.28	20. 3	21.38	23.14	24.51	26.28	28. 6	29.45	31.25	33. 6	34.48	36.33	37.26	49
50	1.33	3. 6	4.40	6.14	7.48	9.21	10.55	12.29	14. 5	15.40	17.16	18.52	20.29	22. 6	23.45	25.24	27. 3	28.43	30.25	32. 8	33.52	35.37	37.26	38.20	50
51	1.35	3.10	4.46	6.22	7.58	9.33	11. 9	12.46	14.24	16. 1	17.39	19.18	20.57	22.37	24.18	25.59	27.41	29.24	31. 8	32.54	34.41	36.30	38.23	39.19	51
52	1.37	3.15	4.52	6.30	8. 8	9.46	11.24	13. 3	14.43	16.23	18. 6	19.44	21.26	23. 8	24.52	26.36	28.21	30. 7	31.55	33.44	35.34	37.27	39.24	40.23	52
53	1.40	3.20	4.59	6.39	8.19	10. 0	11.40	13.21	15. 3	16.46	18.29	20.12	21.57	23.42	25.28	27.16	29. 4	30.53	32.45	34.38	36.33	38.29	40.29	41.29	53
54	1.42	3.24	5. 5	6.49	8.31	10.15	11.57	13.41	15.26	17.11	18.57	20.43	22.30	24.18	26. 7	27.58	29.50	31.42	33.38	35.35	37.32	39.26	41.40	42.46	54
55	1.45	3.29	5.14	6.59	8.44	10.30	12.15	14. 2	15.49	17.37	19.26	21.14	23. 5	24.56	26.49	28.43	30.39	32.35	34.35	36.36	38.39	40.47	42.56	44. 0	55
56	1.47	3.34	5.22	7.10	8.57	10.47	12.35	14.24	16.14	18. 5	19.56	21.49	23.43	25.37	27.34	29.32	31.31	33.33	35.36	37.42	39.51	42. 4	44.19	45.27	56
57	1.50	3.40	5.31	7.22	9.11	11. 4	12.56	14.48	16.45	18.33	20.29	22.25	24.23	26.21	28.22	30.24	32.27	34.34	36.46	38.53	41. 9	43.27	45.50	47. 2	57
58	1.53	3.46	5.40	7.34	9.26	11.22	13.18	15.14	17.10	19. 7	21. 4	23. 4	25. 0	27. 9	29.14	31.21	33.28	35.40	37.54	40.12	42.34	44.59	47.30	48.46	58
59	1.56	3.53	5.50	7.47	9.43	11.42	13.41	15.41	17.41	19.41	21.43	23.47	25.54	28. 1	30.12	32.22	34.12	36.53	39.13	41.37	44. 6	46.40	49.21	50.51	59
60	2. 0	4. 0	6. 0	8. 1	10. 2	12. 4	14. 6	16.10	18.14	20.18	22.26	24.34	26.46	28.55	31. 9	33.27	35.47	38. 9	40.36	43.10	45.48	48.31	51.24	52.51	60
61	2. 3	4. 8	6.12	8.17	10.21	12.27	14.34	16.40	18.49	20.57	23.10	25.23	27.39	29.56	32.16	34.39	37. 5	39.36	42.11	44.52	47.40	50.35	53.42	55.17	61
62	2. 7	4.15	6.24	8.32	10.41	12.52	15. 2	17.14	19.28	21.42	23.59	26.17	28.37	31. 1	33.27	35.57	38.31	41.10	43.54	46.46	49.46	52.56	56.20	58. 4	62
63	2.12	4.24	6.37	8.50	11. 4	13.19	15.34	17.51	20. 9	22.27	24.51	27.15	29.42	32.12	34.45	37.23	40. 5	42.54	45.49	48.53	52. 7	55.36	59.24	61.22	63
64	2.17	4.33	6.51	9. 9	11.28	13.47	16. 8	18.30	20.54	23.18	25.48	28.19	30.52	33.30	36.11	38.57	41.49	44.49	47.57	51.17	54.50	58.43	63. 2	65.22	64
65	2.22	4.44	7. 6	9.30	11.54	14.19	16.45	19.13	21.43	24.13	26.50	29.28	32. 9	34.55	37.46	40.42	43.46	46.59	50.43	54. 2	57.59	62.26	67.36	70.33	95
66	2.27	4.55	7.23	9.52	12.21	14.53	17.26	20. 0	22.37	25.14	27.58	30.44	33.34	36.29	39.31	42.40	45.58	49.26	51.11	57.14	61.47	67. 4	73.52	78.25	6

Of the VARIATION of the COMPASS.

The True Amplitude of the Sun, Moon, or a Star, is the Number of Degrees they riſe or ſet to the Northward or Southward of the Eaſt or Weſt Points of the Horizon; and is always of the ſame Name with the Declination; that is, if the Declination be North, the Amplitude is North; but if the Declination be South, the Amplitude is South of the Eaſt or Weſt Points of the Horizon at their Riſing and Setting.

To find the True Amplitude by the Table of Amplitudes.

Look for the given Latitude at the Top of the Table, and the Declination in the firſt Column on the Left Hand, in the common Angle of meeting, will be the Degrees and Minutes of the Amplitude required.

EXAMPLE I.

In Latitude 40° N. when the Declination was 17° N. required the Sun's true Amplitude at Riſing?

Under Latitude 40° and right againſt the Declination 17 ſtand 22° 26′, the true Amplitude, and is to be counted from the Eaſt towards the North, becauſe it is at the Sun's Riſing, and the Declination is North; that is, E. 22° 26′ N.

But when the Latitude is given in Degrees, and the Declination in Degrees and Minutes, find the Latitude at the Top as before, and the neareſt Degrees to the given Declination in the Left Hand Column: againſt which, and under the given Latitude, ſtands the true Amplitude; or, if the Minutes of the Declination be near 30, or ½ a Degree, find the Amplitude for the given Degrees of Declination, and the Amplitude for one Degree above it; add theſe two Amplitudes together, half their Sum will be the true Amplitude, ſufficiently exact for Practice at Sea.

EXAMPLE II.

Suppoſe I would know the Sun's true Amplitude at his Setting in Latitude 57°, his Declination being 11° 33′ S.

Find the Ampl. as before for the } 11° } which will be { 20° 29′
Lat. 57°, and the Declinations } 12 } { 22 25
their Sum 42 54
half the Sum 21 27 is

the true Amplitude; that is, W. 21° 27′ S. becauſe at Sun Setting, and the Declination South. In like Manner, if the Declination be in Degrees, and the Latitude in Degrees and Minutes, as in

EXAM-

EXAMPLE III.

Suppoſe it were required to find the Sun's true Amplitude at Setting, in Latitude 49° 27′, when his Declination is 21 N.

Now 27 Minutes being nearly half a Degree, therefore,

For Lat. 49 } and Declination 21, the } 33° 6′ }
For Lat. 50 } Amplitudes are } 33 52 }

Sum 66 58

half the Sum is 33 29 the true Amplitude required; that is W. 33° 29′ N. becauſe the Sun was Setting, and the Declination N.

When the Latitude and Declination are both given in Degrees and Minutes, take the neareſt Degrees to both, unleſs they are near 30 Minutes, as obſerved before, and find the Amplitude as in Example I.

EXAMPLE IV.

Suppoſe it were required to find the Sun's true Amplitude at Setting, in Latitude 49° 18′, his Declination being 19° 41′ N.

Now as the Latitude is neareſt to 49°, and the Declination neareſt 20°, therefore under Latitude 49°, and againſt Declination 20, ſtands 31° 25′ N. the true Amplitude; that is, W. 31° 25′ N. the Declination being North, and at the Sun's Setting.

In like Manner may the Amplitude be found with ſufficient Accuracy; and, therefore, think it ſuperfluous to trouble the Mariner with a Table of Numbers, &c. ſince the Amplitude cannot be obſerved nearer than to Degrees at Sea; however, as this Book may come into the Hands of thoſe acquainted with Trigonometry, we ſhall treat of this and an Azimuth, after we have gone through the Journal.

To find the Variation of the Compaſs.

Having found the true Amplitude, by the Table as before taught, it remains now to find the Variation of the Compaſs; to do which, we muſt have the True and Magnetic Amplitude given.

The Variation of the Compaſs is the Number of Degrees the Needle's Points ſtands from the true North or South Points of the Horizon, reckoned to the Eaſtward or Weſtward.

The Sun's Magnetic Amplitude is the Number of Degrees his Centre is Northward or Southward of the Eaſt or Weſt Points of the Compaſs, at the Riſing or Setting, and is found by an Azimuth Compaſs in the following Manner:

Move the Box about till the four Cardinal Points of the Card coincide with the four Lines in the Sides of the Compaſs-Box; keep the Box ſteady, and turn the Index till the Centre of the Sun, at Riſing or Setting, when his lower Edge juſt touches the Horizon, is ſeen through both the Sights; then the Degrees between the North Point of the Compaſs, and the End of the Index pointing to the Sun, will be the Magnetic Amplitude ſought.

Having thus found the True and Magnetic Amplitude, it is plain, that if they agree there is no Variation; but if they differ, which they generally do, the Difference is the Variation.

When the Amplitudes are both North, or both South, ſubtract the Leſs from the Greater, and the Difference is the Variation.

But if one be North, and the other South, their Sum is the Variation: And to know which Way it is, obſerve this general

Rule. Let the Obſerver's Face be turned to the Sun; then, if the True Amplitude be to the Right Hand of the Magnetic, or obſerved Amplitude, the Variation is Eaſterly; but if it be to the Left Hand, Weſterly.

EXAMPLE I.

Suppoſe the Sun's true Amplitude at Riſing, is ſound to be E. 14° 29′ N. but by Compaſs it is found to be E. 26° 12′ N. what is the Variation?

From the Greater E. 26° 12′ N.
Take the Leſs E. 14 29 N.

Remains the Variation 11 43 E.

and is Eaſt, becauſe the true Amplitude is to the Right of the Obſerved.

EXAMPLE II.

Suppoſe the Sun's true Amplitude at Setting, W. 34° 30′ S. and Magnetic Amplitude W. 23° S. required the Variation?

From the Greater W. 34° 30′ S.
Take the Leſs W. 23 00 S.

Remains the Variation 11 30 W.
which is Weſterly, becauſe the true Amplitude is to the Left of the Obſerved.

EXAMPLE III.

Suppoſe the Sun's true Amplitude at Riſing, is E. 13° 30′ N. and his Magnetic Amplitude E. 12° 30′ S. required the Variation, and which Way?

Since the true and obſerved Amplitudes have different Names,

To the true Amp. E. 13° 30′ N.
Add the obſ. Amp. E. 12 30 S.

The Sum is the Variation 26 00 W.

which is Weſterly, becauſe the true Amplitude is to the Left of the Obſerved.

EXAMPLE IV.

Suppoſe the Sun's true Amplitude is E. 1° 50′, and his Magnetic Amplitude E. 32° 28′ required the Variation and which Way?

To the obſerved Amp. E. 32° 28′ N.
Add. the true Amp. E. 1 50 N.

Sum is the Variation 34 18 E.

which is Eaſterly, becauſe the true Amplitude is to the Right of the Obſerved.

Of

Of the Log and Half Minute Glaſs.

THE Log, and Log-Line, by which we meaſure the Ship's Way at Sea, are too well known to every Mariner to be here deſcribed; let it ſuffice to give a few Remarks upon the Manner of dividing the Log-Line, and trying the Half Minute Glaſs.

The Diviſions, or Knots, in the Log-line, are founded upon this, that each Knot ſhould bear the ſame Proportion to a Sea Mile that Half a Minute does to an Hour.

Now a Sea Mile is found to contain about 6120 Feet; this divided by 120, (the Half Minutes in an Hour) gives 51 Feet for the Diſtance between the Knots; but on Account of the Way the Log is found to make after the Ship, one Foot is thrown off, and 50 Feet is taken for the Knot, to anſwer to a Glaſs that runs 30 Seconds; this 50 Feet, being divided by 10, gives 5 Feet to every Fathom, ſo that in caſting up the Log in the Column of Fathoms, each Fathom anſwers to 1, or 1 Tenth of a Knot, and 10 Fathoms make a Knot; which is certainly the beſt adapted for Practice, ſince all the Tables and Inſtruments uſed in Navigation are decimally divided. But ſome experienced Commanders find, that the allowing 50 Feet to a Knot, generally makes the Ship a-head of the Reckoning; and to avoid Danger, moſtly divide the Log-line into Knots of 7 or 7½ Fathoms, of 6 Feet each, to correſpond with a Glaſs that runs 28 Seconds. Others, again, divide the Seconds the Glaſs runs by 4, and take the Quotient for the Diſtance in Fathoms between the Knots: Which of theſe Methods are beſt, I leave to every Captain's own Experience to determine; but certain it is, that whatever Lengths the Knots are, the moſt convenient Way is to divide them into Tenths.

In Hot or Dry Weather, the Glaſs runs out faſter than in Moiſt or Rainy Weather; therefore Care ſhould be taken to try what Number of Seconds the Glaſs runs, which is eaſily done by the following Rule:

Take a Muſket Ball, or ſome ſuch round Subſtance, and faſten a Piece of Pack-thread or Silk to it, and hang it by a Loop upon a Peg or Nail, ſo that the Diſtance between the Centre of the Ball and the Nail be 39,2 Inches, then give it a gentle Swing, turning your Glaſs at the ſame Time, and count the Number of Swings it makes while the Glaſs is running, and they will be the Seconds required.

Care ſhould alſo be taken to meaſure the Log-line pretty often, leſt it ſhould ſtretch and deceive you in the Diſtance.

The Method of Keeping a JOURNAL *at Sea.*

BY keeping a Journal, is meant keeping ſuch an Account of the Ship's Way, that the Mariner may be able at any Time to aſcertain the Latitude and Longitude the Ship is in, and conſequently the Ship's Place; it therefore ſhould be the great Concern of every Perſon who takes upon him the Navigating of Ships to remote Parts, to be expert therein, as the Lives and Fortunes of ſo many Men are committed to his Charge.

When a Ship is bound from one Place to another, which lies ſo far from her, that ſhe is obliged to go out of Sight of Land for any conſiderable Time, as from England to Jamaica; at the Time of her leaving Sight of Land, ſhe is ſaid to take her Departure, and that Part of the Land ſhe then leaves is ſaid to be the Place ſhe takes her Departure from, ſuch as the Land's End, Lizard, &c. and at the Time of taking ſuch Departure, the Captain or Mate generally takes the Bearing and Diſtance of that Land (according to his Judgment) and ſets it down on the Log-Board, or in the Log-Book againſt the Time it was taken; thus Land's End N. N. E. Diſt. 7 Leagues, or Lizard N. by W. Diſt. 5 Leagues, &c.

In the ſame Manner may the Departure from any Place be taken, as may be ſeen in the firſt Day's Log of the following Journal, where the Log-Book is marked in Columns for Hours, Knots, Fathoms, Courſes, Winds, Lee-way, Tranſactions; and under it the Columns for Courſes, Diſtances, Northings or Southings, Eaſtings or Weſtings, the Latitude by Dead Reckoning, Latitude by Obſervation, Meridian Diſtance, Difference of Longitude, Longitude in, and in the laſt the Bearing and Diſtance of the Land.

Notice muſt be taken, that in the Column for Courſe, you are always to ſet down the Courſe you have made by your Reckoning for that 24 Hours; that is, from the Noon of the Day before to the Noon of the Day you work on, the Sea Account being always kept from Noon to Noon.

In the Columns for Diſtance, you are to ſet down the Diſtance made by your Reckoning for that 24 Hours.

In the Columns of Northing and Southing, you are to ſet down the Difference of Latitude made in that 24 Hours, marking the Column with North if the Difference of Latitude be North, and South if South.

In the Column of Eaſting or Weſting, you are to ſet down the Departure made that 24 Hours, marking the Column with Eaſt, if the Departure be Eaſt, and with Weſt if Weſterly.

In the Column marked Latitude by D. R. you are to ſet down the Latitude you reckon yourſelf in on that Day, and in the Column marked

marked Lat. by Ob. you are to ſet down the Lat. found by Obſervation. In the Column of Meridional Diſtance, you are to ſet down (in Degrees and Minutes) the whole Departure you have made from the Place you took your Departure from; alſo the Difference of Longitude made in the 24 Hours in the Column marked Diff. Long. the Longitude in, in the Column marked Long. in, and in the Laſt, the Bearing and Diſtance from the Land.

The Variation, if any, muſt be allowed upon all Courſes ſteered, and upon all Bearings that are taken by the Compaſs; that is, if it be Eaſterly Variation, it muſt be allowed to the Right Hand, if Weſterly, to the Left of the Courſe or Bearing. Suppoſing yourſelf placed in the Centre of the Compaſs, and looking directly forward to the Point you are to allow the Variation upon.

EXAMPLE.

Suppoſe I ſteer S. W. and there is one Point Weſterly Variation, then my true Courſe is S. W. by S. or ſuppoſe I ſet a Point of Land, and find it to bear by the Compaſs E. S. E. and I know there is half a Point Eaſterly Variation, then the true Bearing is S. E. by E. ½ E.

Lee-way muſt be allowed upon all Courſes ſteered, which is the Difference between the Point which the Ship endeavours to ſail upon, and the Point ſhe really ſails upon, and is cauſed by the Force of the Wind or Surge of the Sea when ſhe is cloſe hauled or plying to Windward, which makes her fall off and glide Side-ways from the Point of the Compaſs ſhe capes at, and muſt be allowed to be on the Right Hand of the Courſe ſteered when the Larboard Tacks are on Board, and to the Left Hand when the Starboard Tacks are on Board. The Allowances that are generally made are as follow:

1ſt. When a Ship is cloſe hauled, if all her Sails be ſet, the Water ſmooth, and moderate gale of Wind, ſhe is then ſuppoſed to make little or no Lee-way.

2dly. The Ship being upon a Wind, and the ſmall Sails in, allow one Point for Lee-way.

3dly. The Wind blowing hard, ſo as to cauſe one Top-ſail to be taken in, allow two Points for Lee-way.

4thly. When it blows ſo hard that both Top-ſails are taken in, and the Sea runs high, allow them three Points for Lee-way.

5thly. The Fore-ſail being furled, and the Ship tries under a Main-ſail and a Mizen, allow four Points for Lee-way; for ſhe then makes her Way about four Points before the Beam, as the Sea Phraſe is.

6thly When the Ship tries under the Main-ſail only, ſhe then makes her Way about three Points before the Beam, that is, near five Points for Lee-way.

7thly. If the Ship tries under the Mizen only, her Way is about two Points before the Beam, that is, allow ſix Points for Lee-way.

8thly. When ſhe lies a Hull, that is, with all her Sails furled, her Way is one Point before the Beam, and then ſeven Points is her Lee-way.

9thly. When a Ship is lying-to under a Main-ſail, Mizen, &c. then obſerve how ſhe comes up and falls off, and take the Middle between the two Points, and from that allow the Lee-way and Variation.

Note. In all Caſes, Reſpect muſt be had to the Smoothneſs of the Water, or the Sea's running high, the Mould and Trim of the Ship, and then the Allowances may be rectified with the greater Certainty, by ſetting the Ship's Wake by a Compaſs placed on each Rail of the Ship's Quarter, which is uſually ſet there for that Purpoſe.

EXAMPLE I.

Suppoſe I ſteer N. E. by E. with my Larboard Tacks on Board, and make one Point Lee-way, then my Courſe made good is E. N. E.

Lee-way and Variation, when they are both to be allowed one Way, that is, both to the Right Hand, or both to the Left, add them together, and allow their Sum the ſame Way they were to be allowed.

But if they are to be allowed, one to the Right Hand, and the other to the Left, ſubtract the Leſs from the Greater, and allow the Remainder the ſame Way the Greater was to be allowed.

EXAMPLE II.

Suppoſe I ſteer N. N. W. with my Starboard Tacks on Board, and make one Point Lee-Way, there being at the ſame Time half a Point Weſterly Variation; I would know my true Courſe?

Lee-way to the Left Hand	1 Point.
Variation to ditto	½ Point.
Their Sum to be allowed to the Left Hand	1 ½ whence

The true Courſe is N. W. by N. ½ W.

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EXAMPLE III.

Suppoſe I ſteer S. W. by W. with my Larboard Tacks on Board, and make two Points and an Half Lee-way, and I have one Point and a Quarter Weſterly Variation, what is my true Courſe?

Lee-way to the Right Hand	2½ Points.	
Variation to the Left Hand	1¼ Point.	
The Remainder to be allowed to the Right Hand	1¼	whence

The True Courſe is W. S. W. ¼ Weſterly.

EXAMPLE IV.

Suppoſe a Ship lying-to under a Main-ſail, with her Starboard Tacks on Board, comes up E. by S. and falls off to N. E. by E. there being one Point Weſterly Variation, and ſhe makes 5 Points Lee-way, what Courſe does ſhe make good?

The Middle between E. by S. and N. E. by E. is E. by N. for which allowing 6 Points to the Left Hand, the true Courſe will be N. by E.

Currents, the Way they ſet you, and the Diſtance you ſuppoſe you are driven by them, is to be ſet in the Traverſe Table for the Day, as any other Courſe and Diſtance.

EXAMPLE V.

Suppoſe I try the Current, and find it to ſet W. by N. per Compaſs one Mile per Hour, the Variation being one Point Eaſterly; then if I ſail in that Current 24 Hours, I ſet down in the Traverſe Table as a Courſe, W. N. W. Diſtance 24 Miles.

Heave of the Sea is to be accounted for in the ſame Manner as Currents: As, ſuppoſe there is a great Sea heaving towards the S. W. by my Compaſs, there being half a Point Weſterly Variation, I then ſet down in my Traverſe Table S. W. by S. half Weſterly, with ſo much Diſtance as I judge the Sea has heaved the Ship.

At leaving the Land, the oppoſite Point to the Bearing, with the Variation allowed upon it, and the Diſtance you judge yourſelf from it, muſt be ſet down in the Traverſe Table as a Courſe and Diſtance.

EXAMPLE VI.

Suppoſe having one and a quarter Point Weſterly Variation, the Start bearing by my Compaſs N. N. E. diſtant four Leagues? the oppoſite Point to N. N. E. is S. S. W. which, with the Variation, makes S. $\frac{3}{4}$ Weſterly, for the Courſe to be ſet in the Traverſe Table diſtant 12 Miles.

When you make the Land your Bearing, itſelf (with the Variation allowed upon it) and the Diſtance you judge yourſelf from it, is to be ſet down in the Traverſe Table as a Courſe and Diſtance. This needs no Example.

The Courſes marked on the Log-board are the Courſes ſteered by the Compaſs. In order to obtain the true Courſe, it is neceſſary to allow both for the Variation of the Compaſs, and for the Lee-way upon each Courſe on the Log-board, as has been ſhewn, before they are put into the Traverſe Table.

Every Day, at Noon, the Log-board is to be tranſcribed into the Log-book, which is ruled exactly like the Log-board.

Mariners reckon by the civil Account of Time uſed on Shore, but they keep the Reckoning for the Ship's Place, by beginning at Noon, and counting from thence 24 Hours to the next Noon. From Noon to Midnight, they mark with P. M. ſignifying after Mid-day; and the ſecond 12 Hours with A. M. ſignifying after Mid-night, ending their Day's Work at the Noon of the civil Day.

Hence their Ship's Account is 12 Hours earlier than their Shore Account of Time. And as the Sun's Declination uſed for finally determining the Ship's Place at the End of the Sea Day is calculated for the Noon of the common Day at London, therefore the Declination for the Noon of the civil Day muſt be taken for determining the Latitude, &c. at finiſhing their Day's Account.

There are various methods of keeping a Sea Journal, according to the Sentiments of various Perſons, with regard to what deſerves being recorded: Some approve of a Journal including the Log-book, each Day's work at ſome Length, and ſuch Occurences as ſeem of moſt Importance; while others prefer a ſhort Abſtract of this long Journal, containing little more than the Courſe run, the Latitude and Longitude in, and ſometimes the Bearing and Diſtance of the intended Port, or any other remarkable Cape, Rock, Iſland, &c. for each Day.

In the following Journal the long Form is uſed, as repreſenting more fully each Day's Work, and the neceſſary Corrections; and an Abſtract of this may be drawn out in the ſhorteſt Form that ſeems conſiſtent with Diſtinctneſs. The Learner ought to be thoroughly acquainted with the long Form, and when he does that, he may either continue it, or take the ſhorteſt Form; or retrenching from the firſt, and adding to the ſecond, what Particulars he thinks proper, he may thereby make out a Form adapted to his own particular Taſte.

Rules for correcting the Dead Reckoning by an Obſervation.

NOtwithſtanding the Rules already laid down for keeping a Ship's Way at Sea, yet by Reaſon of the ſeveral Accidents that may attend a Ship in one Day's Run, ſuch as ſwelling Seas, different Rates of ſailing between the Times of heaving the Log, Want of Care at the Helm in letting the Ship yaw or fall aff, accidental Currents, ſudden Squalls, when no Account can be kept, &c, the Latitude by Account, and Latitude by Obſervation, may very often differ, then it is neceſſary that proper Corrections be made in the Difference of Longitude.

When you have made all proper Allowances you can, ſuch as for Lee-way, Variation, Currents, &c. and ſtill find that your Latitude by Account will not agree with your Latitude by Obſervation, then you muſt correct as follows:

Firſt, Conſider whether you have made proper Allowances for Currents, Heave of the Sea, if the Courſe at the Helm has been carefully attended to, if the Log-line and Half-minute Glaſs be juſt, and the Log properly hove, or any ſudden Squalls, or proper Allowances made for the Lee-way, &c. which of theſe you conjecture your Error is in, make what Allowances you think meet to your Difference of Latitude and Departure by Dead Reckoning, and ſee if that will reform your Latitude by Account, ſo as to make it agree with your Latitude by Obſervation; if it does, you have gueſſed right; (for you muſt always keep to the Latitude by Obſervation, it being the only Thing to be depended on) but if it will not agree with the obſerved Latitude, it is to be ſuppoſed that there are Miſtakes in your Conjecture, or ſome other Cauſe which produces the Error in the Reckoning, and ſtands in need of being corrected.

EXAMPLE I.

Yeſterday, at Noon, we were in Lat. 36° 15′ N. and have ſailed theſe 24 Hours S. E. $\frac{1}{2}$ E. 55 Miles, N. E. by N. 20 Miles W. S. W. 70 Miles, S. by W. $\frac{1}{2}$ Weſt. 20 Miles, and by Obſervation this Day at Noon we are in Lat. 34° 56′ N.

The TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. E. ½ E.	55		34.9	42.5	
N. E. by N.	20	16.6		11.1	
W. S. W.	70		26.8		64.7
S. by W. ½ W.	20		19.1		5.8
		16.6	80.8	53.6	70.5
			16.6		53.6
			64.2		16.9

By the Traverſe Table it appears, that by Account the Diff. of Lat. is 64.2 S. and the Depart. 16.9 W.

Lat. ſailed from	36°	15′ N.
Diff. of Lat. by Account	1	4 S.
Lat. in by Account	35	11 N.

Differing 15 Miles from the Lat. by Obſervation.

I firſt examine the Log-line and Half-minute Glaſs, and find them both right. Next I conſider whether there be any Current, and I think I have Reaſon to ſuſpect one: Upon Trial I find there is one ſetting S. S. W. ¾ W. at the Rate of 7 Fathoms an Hour, and judge I have been in it theſe 24 Hours, then 7 Fathoms (or Tenths of a Knot) per Hour, in 24 Hours, makes about 17 Miles; and to the Diſt. 17 Miles, and Courſe S. S. W. ¾ W. the Difference of Lat. is 14.6 S. and Depart. 8.7 W.

	Diff. Lat.	Dep.
Now by Tra. Table	64.2S.	16.9W.
And by Current	14.6S.	8.7W.
Correct. for Cur.	78.8S.	25.6

Lat. ſailed from	36°	15′N.
Diff of Lat. cor. for Cur.	1	19 S.
Lat. in correct. for Cur.	34	56

Which, agreeing with my Lat. by Obſervation, I conclude that my Reckoning is right; then having the Lat. left, and Lat. come to, the Diff of Long. may be found either by Middle Lat. or Mercator's Sailing, as before.

If, after all proper Allowances are made for Errors in Diſtance, Currents, &c. the Lat. by Account and obſerved Lat. ſhould diſagree, then the Reckoning muſt yet be farther corrected; to do which, the following are the common, and ſeem to be the moſt rational Methods.

CASE I.

If the Courſe found by Dead Reckoning be leſs than 3 *Points or* 33 *Degrees.*

Rule. To the Diff. of Lat. and Dep. by Account find a Courſe; to this Courſe and the Diff. of Lat. by Obſervation, find the Diff. of Long. either by Middle Lat. or Mercator's Sailing.

EXAMPLE.

Yeſterday, at Noon, we were in Lat. 39° 18′ N. by an Obſervation this Noon we are in Lat. 37° 48′ N. and our Dead Reckoning gives 107 Miles of Southing, and 64 of Weſting; required the true Diff. of Longitude?

To the Diff. of Lat. 107, and Dep. 64, I find the Courſe is 2¾ Points; then with the Meridional Diff. of Lat. between the two Obſervations 115, and the ſame Courſe, I find the true Diff. of Long. 69 Miles.

CASE II.

If the Courſe found by Dead Reckoning be more than 3 *Points, or* 33°, *and leſs than* 5 *Points, or* 56.°

Rule. With the Diff. of Lat. and Dep. by Account, find the Diſtance; with this Diſtance, and the Diff. of Lat. by Obſervation, find another Departure. Take half the Sum of this Dep. and Dep. by Account, for the true Dep. with which, and the Diff. of Lat. by Obſervation, find the Diff. of Long.

EXAMPLE.

Yeſterday, at Noon, we were in Lat. 52° 40′ N. and are this Noon in Lat. 54° 22′ N. having by Account made 84 Miles of Northing, and 76 Miles of Weſting; required the true Diff. of Longitude?

To the Diff. of Lat. 84, and Dep. 76, the Diſtance is 113 Miles, and the Courſe 48°.

To Diſt. 113, and Diff. of Lat. between the two Obſervations 102, the Dep. is 47,7; then 76 added to 47,7, is 123,7, half of which is 61,8, the true Dep.

To Dep. 61,8, and Diff of Lat. by Obſervation 102, the Courſe is 31°, and with the Courſe 31°, and the Meridional Diff. of Lat.

tween the two Obſervations 171, I find the Diff. of Long. 103 Miles.

CASE III.

If the Courſe by Dead Reckoning be more than 5 Points, or 56°.

Rule. With the Diff. of Lat. and Departure by Account find the Diſtance; then with the Diſt. and Diff. of Lat. by Obſervation find the Diff. of Long.

EXAMPLE.

Yeſterday, at Noon, we were in Lat. 38° 52′ N. to-day at Noon we are in Lat. 40° 18′ N. and by Account have made 68 Miles of Northing, and 112 Miles of Weſting; required the true Difference of Longitude?

With the Diff. of Lat. 68, and Depart. 112, I find the Diſt. 132 Miles, and to Diſt. 132, and Diff. of Lat. by Obſervation 86, the Courſe is 49° 30′ nearly; with this Courſe, and the Mer. Diff of Lat. between the two Obſervations 111, the Diff. of Long. is 130 Miles.

Note.) As the true Place of a Ship depends upon her Lat. and Long. being truly aſcertained, I have ſet theſe down only, the reſt being of leſs Conſequence to the Mariner.

To correct for ſeveral Days.

By Help of the three preceding Rules, the Long. may always be corrected for a ſingle Day, but if an Obſervation has been wanted for one or more Days, then mark the Lat. and Long. at laſt Obſervation, or if this be your firſt Obſervation ſince leaving the Land, mark the Lat. and Long. of the Land you left; this is the only Lat. and Long. you can call certain, all the following Part of the Reckoning muſt undergo a Correction, which is made as follows:

Take the Northings, Southings, Eaſtings, and Weſtings, that you have made ſince your laſt Obſervation; or if it be your firſt Obſervation, then for every Day from your leaving the Land, minding not to leave out the Diff. of Lat. and Dep. of the Day you correct on, and bring them into a Traverſe Table, by which you will have the whole Diff. of Lat. and Dep. by Account ſince the laſt Obſervation; and with that ſame Diff. of Lat. and Dep. find the Courſe by Dead Reckoning, then obſerve which of the foregoing Caſes that Courſe falls under, and correct by the Rule for that Caſe.

But when an Obſervation has been wanting for ſeveral Days, then mark the Lat. and Long. you were in at your laſt Obſervation, or leaving the Land as before, then you may correct with a greater Degree of Certainty by the following Rules:

CASE I.

Reckoning from the laſt certain Latitude and Longitude.

When the Courſe given by the Meridional Diff. of Lat. and Diff. of Long. by Account taken as Diff. of Lat. and Dep. is leſs than 3 Points, or 33 Degrees.

Rule. To the Mer. Diff. of Lat. and Diff. of Long. by Account (taken as Diff. of Lat. and Dep. as ſhewn in the Mercator's Sailing) find a Courſe, with this Courſe and the Mer. Diff. of Lat. by Obſervation, find a correſponding Dep. which will be the correct Diff. of Long.

EXAMPLE.

Having ſailed three Days ago from Lat. 49° 57′ N. and got no Obſervation till this Day at Noon, and find I am in Lat. 45° 23′ N. and by Dead Reckoning I am in 45° 12′ N. having differed my Long. 171 Miles, required my true Difference of Longitude?

		M. Parts.			M. Parts.
Lat. ſailed from	49 57 N.	3470	Lat. ſailed from	49 57	3470
Lat. by Account	45 12 N.	3047	Lat. by Obſer.	45 23	3063
Mer. Diff. of Lat. by Acc.		423	Mer. Diff of Lat. by Obſ.		407

To Merid. Diff. of Lat. by Acc, 423, and Diff. of Long. by Acc. 171, the Courſe is 22°. Then with the Courſe 22°, and Meridional Diff. of Lat. between the Obſervation 407, I find the Diff. of Long. is 164 Miles.

CASE II.

When the Courſe given by the Meridional Diff. of Lat. and Diff. of Long. by Account (taken as before) is greater than 3 Points, and leſs than 5 Points.

Rule. To the Merid. Diff. of Lat. and Diff. of Long. by Account, taken as Diff. of Lat. and Dep. find a Diſtance, with this Diſtance, and Merid. Diff. of Lat. by Obſervation, find a correſponding Departure; Half the Sum of this Dep. and the Diff. of Long. by Acc. is the correct Diff. of Longitude.

EXAMPLE.

Three Days ago we were in Lat. 45° 23′ N. and have ſince that Time ſailed between South and Weſt, have by Dead Reckoning altered our Lat. 94 Miles, and our Long. 147 Miles, but by an Ob-

ſervation

ſervation this Day, we find we are in Lat. 43° 34′; required the correct Diff. of Long.

		M. Parts.			M. Parts
Lat. ſailed from	45° 23′ N.	3063	Lat. ſailed from	45° 23′	3063
Lat. by Acc.	43 29 N.	2931	Lat. by Obſer.	43 34	2910
Mer. Diff. of Lat. by Acc.		132	Mer. Diff. by Obſer.		153

With the Merid. Diff. of Lat. by Acc. 132, and Diff. of Long. by Acc. 147, I find the Diſtance 198, and Courſe 42°. Then to Diſtance 198, and Merid. Diff. of Lat. by Obſervation 153, the Dep. is 125, now 125 added to 147, is 272, and half this Sum, viz. 136, is the correct Diff. of Long.

CASE III.

When the Courſe given by the Mer. Diff. of Lat. and Diff. of Long. by Acc. (taken as before) is more than 5 Points, or 56 Degrees.

Rule. To the Merid. Diff. of Lat. and Diff. of Long. by Acc. (taken as Diff. of Lat. and Dep.) find a Diſtance.

To this Diſt. and Merid. Diff. of Lat. by Obſervation, find a correſponding Dep. this Dep. will be the correct Diff. of Long.

EXAMPLE.

Two Days ago I was in Lat. 43° 34′ N. and have ſince then made by Acc. 50 Miles of Southing, and 256 Miles Diff. of Long. Weſt. but find, by Obſervation, that I am in 42° 30′ N. what is my true Diff. of Long.

		M. Parts.			M. Parts.
Lat. ſailed from	43° 34′ N.	2910	Lat. ſailed from	43° 34′	2910
Lat. by Acc.	42 44 N.	2841	Lat. by Obſ.	42 30	2822
Mer. Diff. of Lat. by Acc.		69	Mer. Diff. of Lat. by Obſ.		87

Then to Mer. Diff. of Lat. by Acc. 69, and Diff. of Long. by Acc. 256 (taken as Diff. of Lat. and Dep.) the Diſtance is 265, and Courſe 73 Degrees.

And to Diſtance 265, and Diff. of Lat. 87, (the Merid. Diff. of Lat. by Obſervation) the Dep. is 250, which is the correct Diff. of Long.

Here we have given at ſome Length the different Methods of correcting the Dead Reckoning by an Obſervation, which are readily done by the Table of Diff. of Lat. and Dep.

A

JOURNAL of a VOYAGE

FROM

LONDON to MADEIRA:

In the CATHERINE, of LONDON, J. HEBDEN,
Commander, kept by T. WHITE, Mate.

Departure taken from the Lizard in Lat. 49° 57′N. Long. 5° 14′W.
Bound for Funchal, in Madeira, in Lat. 32 38 N. Long. 17 6 W.
Bearing from the Lizard Point S. 27° W. Diſtance 1156 Miles.

In order to ſhorten the following Work, it may be proper to obſerve here, that + ſignifies Addition ; — Subtraction ; × Multiplication ; ÷ Diviſion ; equal to ; : :: : Proportion, or the Rule of Three, thus, 2 : 4 :: 3 : 6 ; that is, as 2 is to 4, ſo is 3 to 6.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Sunday, May 4th.
2						Theſe 24 Hours moderate Gales, and fair Weather.
4						
6						
8	4		S. W. by W.	N. E.		At 6 P. M. the Lizard bore N. E. Diſtance 6 Leagues, from which I take my Dep. it being in the Lat. of 49° 57′ N. and Long. 5° 14′ Weſt of London.
10	4	5				
12	5					
2	5					
4	5	5	S. W.			Unbent the Cables and ſtowed the Anchor.
6	5	5				Several Sail in Sight, ſtanding to Weſtward.
8	5	5				
10	5	5				
12	6					Variation 1½ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Ob.	Mer. Diſt.	Diff. Lon.	Long. in	Bearing and Diſt.
S. 27° W	107	96	48	48. 21 N.		0° 48′	73	6° 27′ W.	Func. S. 27° W. 1060 M.

The Lizard bearing N. by E. Diſt. 6 Leagues from the Ship is the ſame as if the Ship had ſailed from the Lizard 6 Leagues or 18 Miles upon the oppoſite, or S. by W. Point of the Compaſs, and allowing for the Variation (as before taught) makes it S. half E. Diſt. 18 Miles, which is to be ſet down as the firſt Courſe and Diſtance in the following Traverſe Table.

The firſt Courſe ſteered by Compaſs is S. W. by W. which, allowing for the Variation, makes S. W. by S. half W. and the Sum of all the Diſtances ſailed on that Courſe till 2 o'Clock, when it alters, is 18 Miles and an half, which being doubled, becauſe the Log is heaved every 2 Hours, gives 37 Miles; ſo the ſecond Courſe and Diſt. to be ſet down in the Traverſe Table is S. W. by S. half W. 37 Miles. In like Manner the ſecond Courſe ſteered is S. W. and the Variation allowed makes it S. S. W. half W. and the Diſt. on that Courſe ſummed up and doubled, gives 56 Miles; therefore the third Courſe and Diſt. to be ſet down in the Traverſe Table is S. S. W. half W. 56 Miles. Having found the whole Difference of Latitude and Departure made upon the ſeveral Courſes, I then mark down upon my Slate or Paper what every Thing that is to be found comes to, and afterwards ſet them down in their proper Columns as above.

Traverse Table.

Courſes	Diſt.	N.	S.	E.	W.
S. ½ E.	18		17. 9	1. 8	
S. W. by S. ½ W	37		8. 6		23. 5
S. S. W ½ W.	56		9. 4		26. 4
			95. 9		49. 9
					1. 8
					48. 1

Now to Diff. of Lat. 95. 9 S. and Dep. 48 1 W. the Courſe is S. 27° W. Diſt. 107 Miles;

then Lat. ſailed from, or Lizard's Lat.	49° 57′ N.
Diff. of Lat.	1 36 S.
Lat. in, or Ship's Lat.	48 21 N.
Sum of Lats.	98 18
Middle Lat.	49 09
Com. of Middle Lat.	40 51

Then with this Com. of Mid. Lat. 40° 51′, or 41° found as a Courſe among the Degrees, and the Dep. 48. 1. in its Column, in the Diſt. Col. ſtands 73, which is the Diff. of Long.

Longitude ſailed from, or Lizard's Longitude		5° 14′ W.
Difference of Longitude 73 Miles	=	1 13 W.
Longitude in, or Ship's Longitude		6 27 W.

Now to find the Courſe and Diſtance to the intended Port;

		Mer. Parts.		
Ship's Lat,	48° 21′ N.	3323	Ship's Long.	6° 27 W.
Funchal's Lat.	32 38 N.	2073	Funchal's Long.	17 6 W.
Diff. Lat. 943 Miles =	15 43	Mer. Diff. Lat. 1250	Diff. of Long. 639 Miles =	10 39 W.

So from the Ship to Funchal the Courſe is found by Mercator's Sailing to be S. 27° W. Diſtance 1060 Miles.

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Monday, May 5th.
2	6		S. W. by W.	N.		Theſe 24 Hours moderate Gales and cloudy Weather
4	5	5				
6	5			N. W.		At 4 P. M. ſpoke with the Charming Nancy from Carolina, bound to London.
8	5					
10	3	6	S. W.			
12	3	4				
2	3	4				
4	4	5				
6	4	6				P. M. got the beſt and ſmall Bower Anchors on the Gunnel, and unbent the Cables and ſtowed them.
8	5		W. by S.	WNW.		
10	4	5				
12	4					Variation 1 ½ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer Diſt.	Dif.Lon.	Long.in	Bearing and Diſt.
S. 30° W.	107	93	53	46. 48.N.		1.41 W.	1. 19. W.	7. 46.	Funchal S. 27° W. 952 Miles.

The Variation being allowed upon each Courſe, and the Diſtances ſummed up, as before taught, the Traverſe Table and other Work will be as follows :

TRAVERSE TABLE.					
Courſes.	Diſt.	N.	S.	E.	W.
S.W. by S. ½ W.	43		33.2		27.3
S. S. W. ½ W.	39		34.4		18.4
S. by W. ½ W.	27		25.8		7.8
			93.4		53.5

Now to Diff. of Lat. 93.4. and Dep. 53.5 the Courſe is 30°, and Diſtance 107 Miles.

Lat. from, or laſt Day's Lat.	48°	21′N.
Difference of Latitude	1	33S.
Latitude in, or Ship's Latitude	46	48N.
Sum Latitudes	95	09
Middle Lat.	47	35
Com. Mid. Lat.	42	25

Long. from, or laſt Day's Long.	6°	27′W.
Diff. Longitude	1	19 W.
Longitude in, or Ship's Long.	7	46 W.

And to Com. Mid. Lat. 42. 25, or 42°, and Departure 53. 5, the Difference of Longitude is 79 Miles.

Then for the Courſe and Diſtance from the Ship to Funchal.

Ship's Latitude	46° 48′N.	3185	Ship's Longitude	7° 46′W.
Funchal's Latitude	32 38 N.	2073	Funchal's Long.	17 6 W.
Diff. of Lat. 850 = 14 10		Mer. Diff. 1112	Diff. Long. 560 Miles. =	9 20

Hence the Courſe and Diſtance from the Ship to Funchal is found as above.

Note. As the Tables are only calculated to ſingle Degrees, the neareſt Degree to the Comp. of Mid. Lat. is taken to find the Diff. of Long. by, which is near enough for all common Purpoſes at Sea; thus, the Com. of Mid. Lat. is 42° 25′, for which I take 42° to find the Diff. of Longitude.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Tueſday, May 6th.	
2	4		S. W.	W. N. W.		Theſe 24 Hours moderate Gales and clear Weather.	
4	4						
6	4					At 6 P. M. ſaw a Ship to the Northward.	
8	4	4	S.W.byS.	W. by N.	½		
10	4	5				Obſ. the Sun's Zen. Diſt. at Noon	28° 20′S
12	4	6				Declination	17 03 N.
2	4	5				So the Latitude is	45 23 N.
4	4		S. S. W.	W.	½		
6	4						
8	4						
10	4						
12	4					Variation 1½ Point Weſterly.	

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Dif.	Dif. of Long.	Long. in	Bearing and Diſt.
8°30′ W.	97	96	14	45. 12 N	45.23N.	1. 55 W.	0.21	8. 1	Funchal S. 29° W. W. 873 Miles.

By allowing for the Variation on each Courſe as before, and the Lee-way on the two laſt Courſes, the Work will be as follows :

Courſes.	Diſt	N.	S.	E.	W.
S. S. W. ½ W	24		21. 2		1. 3
S. by W.	36		35. 3		7
S. ½ E.	40		39. 8	3. 9	
			96. 3	3. 9	18. 3
					3. 9
					14. 4

Now to Diff. of Lat. 96,3, and Dep. 14.4, the Courſe is S. 8° 30′ W. Diſt. 97 Miles.

Lat. from, or laſt Day's Lat.	46° 48′N.
Difference of Latitude	1 36 S.
Latitude in by Account	45 12 N.
Sum Lats.	92 00
Middle Lat.	46 00
Com. Mid. Lat.	44 00

To Com. Middle Lat 44, and Dep. 14, the Diff. of Long. is 21 Miles.

Long. from, or laſt Day's Long.	7° 46′W.
Difference of Longitude	0 21 W.
Longitude in by Account	8 7 W.

Here the Latitude by D. R. differing 11 Miles from the Latitude by Obſervation, I correct for the true Longitude; and as this is the firſt Obſervation got ſince leaving the Land, I correct by Caſe I. Page 47, as follows :

		Mer. Parts.
Lizard's Lat.	49° 57′N.	3470
Ship's Lat. by Account	45 12 N.	3047
Mer. Diff. of Lat. by Account		423
Lizard's Lat.	49° 57′N.	34 70
Ship's Lat. by Obſervation	45 23 N.	30 63
Mer. Diff. by Obſervation		407
Lizard's Longitude	5° 14′W.	
Ship's Long. by Account	8 7 W.	
Diff. of Long. by Acc.	2 53=173Miles	

To Mer. Diff, of Lat. by Account 423, and Diff. of Long. 173, the Courſe is 2 Points; and to Courſe 2 Points, and Mer. Diff. of Lat. by Obſervation 407, the Diff. of Long. is 167.

Lizard's Long.		5° 14′W.
True Diff. of Long.	167=2	47 W.
Ship's true Long.		8 1 W.

And to Courſe 2 Points, and Diff. of Lat. between Lizard and Ship 274, the Diſtance is 296 Miles.

Hence the Ship has ſailed from the Lizard S. S. W. 296 Miles, and the Courſe and Diſtance to the intended Port is found as above.

H.	K.	F.	Courſes.	Winds.	Leeway.	Remarks on Board, Wedneſday, May 7th
2	3	5	S. by W. ¾ W.	W.	1	Theſe 24 Hours moderate Gales and clear Weather.
4	3	5				
6	3	5				
8	3					P. M. Set up the Main and Mizen Top Maſt Shrouds and Back Stays.
10	3	5				
12	3					
2	3					
4	3		S. by W.	W. by S.	1	
6	3					
8	3					
10	3					Variation is 1¼ Point nearly, or 13° 48′ W. per Ampl.
12	3					

Courſe	Diſt.	S.	E.	Lat. by D. R.	Lat by Obſ.	Mer Diſt	Diff. of Long.	Long. in.	Bearing and Diſt.
S. 9° E.	76	75	12	44° 8′ N.		1° 43′	0° 16′	7° 45′ W.	Funchal S. 32° 30 W. 817 Miles.

Allowing for the Variation and Leeway, as before, the Work will ſtand as under :

Traverse Table					
Courſes	D.	N.	S.	E.	W.
S. ½ E.	46		45.8	4.5	
S. by E. ¾ E.	30		29.1	7.3	
			74.9	11.8	

Now to Diff. of Lat. 74.9 S. and Dep. 11.8 E. the Courſe is S. 9° E. Diſt. 76 Miles.

Lat. from, or laſt Day's Lat.	45°	23′ N.
Diff. of Lat.	1	15 E.
Latitude in	44	8 N.
Sum Lats.	89	31
Mid. Lat.	44	45
Com. Mid. Lat.	45	15

And to Co. Mid. Lat. 45° 15′, or 45°, and Dep. 11.8, the Diff. of Long. is 16′ E.

Long. from, or laſt Day's Long.	8°	1′ W.
Diff. of Long.	0	16 E.
Longitude in	7	45

Having the Lat. and Long. in, the direct Courſe and Diſtance to the intended Port is found (by Mercator's Sailing) as above.

Note. When the Tenths on any Side are more than 5, or Half a Mile, you muſt call that Side one Mile more than you found it to be; but when they are leſs than 5, then you neeed take no Notice of them; as in the above the Difference of Latitude and Departure are 74. 9. and 11. 8. which I call 75 and 12, becauſe the Tenths are above 5.

But when you take the Difference of Latitude and Departure to find the Courſe by, then take them in Miles and Tenths; the ſame may be obſerved in caſting up the Knots and Fathoms. If, when doubled, the Tenths are more than 5, ſet 1 Mile more in the Traverſe Table; but if leſs, omit them, as there are no Tenths in the Diſtance Columns.

H.	K.	F.	Courſes.	Winds.	Leeway.	REMARKS on Board, Thurſday, May 8th.
2	5	5	W. Handed	S. S. W.	3½	Theſe 24 Hours hard Gales and ſqually,
4	3	5	Main-Sail			with ſmall Rains.
6	3	5	Handed Fore	Sail,		
8	Lay	too	up N. W. by N.	off N. by E.		
10	drift	1½	Mile per Hour		5	Saw a Ship to Windward with her Jury-
12	up.	N W	off N.		5	Maſts up.
2						
4					1	
6	Set	the	Fore Sail cloſe	reefed	and	Main-Sail, more moderate.
8	5		S. W.	NWbyW½W	½	Set Top-Sails cloſe reefed.
10	5					
12	5					Variation 1¼ Point Weſterly.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt	Dif. of Long.	Long. in	Bearing and Diſt
S. 81° 30′ W.	25	4	25	44° 4′ N.		2° 8′	35′ W.	8° 20′ W.	Funchal S. 31° W. 800 Miles.

Taking the middle Point between the Point on which the Ship comes up, and the Point which ſhe falls off for the ſecond and third Courſes, as taught in the Rules for lying-to, and then allowing as before for the Variation and Leeway, the Traverſe Table will ſtand as follows:

Courſes.	Diſt	N.	S.	E.	W.
W. N. W. ¼ W.	21	7.1			19.8
N. N. E. ¾ E.	9	7.7		4.6	
N. by E. ¾ E.	9	8.5		3.0	
S. S. W. ¼ W.	30		27.1		12.8
		23.3	27.1	7.6	31.6
			23.3		7.6
			3.8		25.0

Now to Diff. of Lat. 3.8 S. and Dep. 25 W. the Courſe is 81° 30′ W. Diſt. 25 Miles.

Lat. from, or laſt Day's Lat. 44° 08′ N.
Diff of Lat. 00 4 S.

Lat. in 44 04 N.
Sum Lats. 88 12
Middle Lat. 44 06
Com. Mid. Lat. 45 54

And to Com. Mid. Lat. 45° 54′, or 46°, and Deg. 25, the Diff. Long. is 35 Miles.

Long. from, or laſt Day's Long. 7° 45′ W.
Diff. of Long. 0 35 W.

Long. in. 8 20

Then to find the Courſe and Diſtance to Funchal;

		Mer. Parts.		
Ship's Lat.	44° 4′ N.	2952	Ship's Long.	8° 20′ W.
Funchal's Lat.	32 38	2073	Funchal's Long.	17 6 W.
Diff. of Lat. 686 Miles =	11 26	Mer. 878	Diff of Long. 526 =	8 46

Hence the Courſe and Diſtance from the Ship to the intended Port is found as above.

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Friday, May 9th.
2				Calm		The firſt 8 Hours calm and foggy, the reſt ſtiff Gales and clear.
4						
6						
8						A Current all Day ſetting N. W. by N. one Mile per Hour.
10	3	5	W. S. W.	S. E.	1	
12	4	4				
2	4	6				
4	4	8				
6	4	6				
8	4	8				
10	4	8				
12	4	5				Variation 1¼ Point Weſterly.

Courſes.	Diſt.	S.	W.	Lat by D. R.	Lat. by Obſ.	Mer. Diff.	Diff. of Long.	Long. in	Bearing and Diſt
S. 80° W.	84	15	83	43° 49′ N.	43° 34′ N.	3° 31′ W.	2° 3′	10° 4′ W.	Func. S. 26° W. W. Diſ. 735 M.

The ſetting of the Current and its Drift in 24 Hours being made a Courſe and Diſtance, as has been taught, and the Variation and Leeway allowed for as before, the Work will be a follows.

TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. W. by W. ¾ W.	72		30.8		65.1
N. W. ¼ W.	24	6.1			17.8
		16.1	30.8 16.1		82.9
			14.7		

Now to Diff. Lat. 14.7 S. and Dep. 82.9, W. the Courſe is S. 80° W. Diſt. 84 M. Lat.

from, or laſt Day's Lat.	44° 4′	N.
Diff. Lat.	0 15	S.
Latitude in	43 49	N.
Sum Lats.	87 53	
Middle Lat.	43 57	
Com. Mid. Lat.	46 3	

And to Com. Mid. Lat. 46° 3′, or 46°. and Dep. 82.9 the Diff. of Long is 115 Minutes.

Long. from, or laſt Day's Long.	8° 24′W.
Diff. Long.	1 55
Long. in by Account	10 15

But the Lat. by Obſervation differing from the Lat by Account, I correct for the true Long. and as our laſt Obſervation was three Days ago, I work as follows. (See Caſe II. Page 47.)

		M. Pts.
Laſt obſerved Lat.	45° 23 N.	3063
Ship's Lat. by Account	34 49 N.	2931
Mer. Diff. by Account		132
Laſt abſerved Lat.	45° 23′N.	3063
Ship's Lat. by Obſ.	43 34 N.	2910
Mer. Diff. of Lat. by Obſ.		153

Long. at laſt Obſ.	8° 1′
Ship's Long. by Acc.	10 15
Diff. of Long. by Acc.	2 14=134 Miles.

To Mer. Diff. of Lat. by Acc. 132, and Diff. of Long. by Account 134, the Diſtance is 190.

And to Diſt. 190, and Mer. Diff. of Latitude by Obſervation 153, the Diff. of Longitude is 112.

Then 134+112=246, half this Sum 123 is the true Diff. of Long.

Long at laſt Obſervation	8° 1′W.
Diff of Long. 123=	2 3 W.
Ship's true Long.	10 4

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Saturday, May 10th.
2	4	5	W. S. W.	S.		Theſe 24 Hours moderate Gales, with Showers of Rain.
4	4	5				
6	4	5				A great Swell from the S. W. for which I allow 6 Minutes.
8	4					
10	4					
12	4					
2	3	5				
4	3	5	S. W. by W.	S. by E.		
6	3	5				
8	3					
10	3					
12	3					Variation 1 Point per Azimuth.

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Dif.	Dif. Lon.	Lon. in.	Bearing and Diſt.
S. 53° W.	83	50	67	42°44′N.		4° 38′	1° 33′W.	11° 37′	Funchal S. S. W. Diſt. 657 Miles.

In this Day's Work the Swell is to be conſidered as a Current, whoſe Drift in 24 Hours is 6 Miles, the Allowance made for the Swell; and as it comes from the S. W. it heaves the Ship towards the N. E. and the Variation allowed upon it makes laſt Courſe N. E. by N. as in the Traverſe Table.

TRAVERSE TABLE.

Courſes.	Diſt	N.	S.	E.	W.
S.W. by W.	58		32. 2		48. 2
S. W.	32		22. 6		22. 6
N. E. by N.	6	5		3. 2	
		5	54. 8	3. 3	70. 8
			5		3. 3
			49. 8		67. 5

Now to Diff. of Lat. 49.8 S. and Dep. 67.5 W. Courſe S. 53° W. Diſt. 83 Miles.

Lat. from, or laſt Day's Lat.	43°	4′N.
Diff. of Latitude	0	50 S.
Latitude	42	44 N.
Sum Lats.	86	18
Mid. Lat.	43	9
Com. of Mid. Lat.	46	51

And to Com. Mid. Lat. 46° 51′, or 47°, and Dep. 67.5, the Diff. of Long is 93 Miles.

Long. from	10°	14′W.
Diff. of Long. 93 Miles	1	33
Long. in.	11	37

To find the Bearing and Diſtance of the intended Port, on Mercator's Chart.

Lay a Ruler acroſs Mercator's Chart, in Lat. 42° 44′, and ſet one Foot of the Compaſſes on the Meridian of London, and the other in Long. 11° 37′ W. lay off that ſame Diſtance from the Meridian of London, by the Edge of the Ruler, and that will ſhew the Ship's Place. Then lay the Ruler over the Ship's Place and Funchal, and take the neareſt Diſtance between the Ruler and the Centre of the Compaſs, ſlide one Foot along the Side of the Ruler, and the other Foot will ſhew the Courſe to be S. S. W. Again, (keeping the Ruler as before) take from the gradual Parallel the Diff. of Lat. between the Ship and Port (10° 6′) in your Compaſſes, and ſlide one Foot along the Ruler, holding both Points parallel to the N. and S. Lines, till the other cuts the E. and W. Lines, paſſing through the Ship's Place; the Diſtance between where the Point reſted, by the Edge of the Ruler, and Funchal being meaſured upon the graduated Parallel, gives nearly 11°, or 660 Miles for the Diſtance. In like Manner find the Bearing and Diſtance of any other Place from the Ship.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Sunday, May 11th.
2	4	5	W. by N.	S.W. by W.	0	Theſe 24 Hours freſh Gales and clear Weather
4	4	5				
6	4	5				
8	5					
10	5					
12	5					
2	5	5	W. ½ N.	S.S.W½ W.	½	
4	5	5				
6	5	5				
8	5	5				
10	5	5				
12	4					Variation 1 Point Weſterly,

Courſe.	Diſt.	S	W.	Lat by D.R.	Lat. by Obſ.	Mer. Diſt.	Diff. of Long.	Long. in	Bearing and Diſt.
W.	120		120	42° 44′	42° 30′	6° 38′		14° 14′	Funchal S. 12° W. 608 Miles.

The Variation being allowed upon both Courſes, and the Lee-way upon the ſecond, it will be found that the Ship has ſailed all this Day due Weſt; or on a Parallel; and by ſumming the Diſtance up, they are found to be 120 Miles; which is alſo her Departure, and ſhe has made no Difference of Latitude; conſequently her Latitude by D. R. is the ſame as Yeſterday, 42° 44′ N.

As the Ship has ſailed upon a Parallel, her Diff. of Long. muſt be found by Parallel Sailing; wherefore in Lat. 42° 44′ to Dep. 120, the Diff. of Long. is 164=2° 44′W.

Longitude from, or laſt Day's Longitude	11	37W.
Longitude in by Account	14	21W.

But the Lat. by Account differing from the Lat. by Obſervation, I muſt correct for the true Longitude, and as it is two Days ſince my laſt Obſervation, I correct it as follows, by Rule III. Page 183.

		M. Pts.
Laſt obſerved Latitude	43° 34′	2910
Ship's Lat. by Account	42 44	2841
Mer. Diff. by Account		69
Laſt obſerved Latitude	43° 34′	2910
Ship's obſerved Lat.	42 30	2822
Mer. Diff. by Obſervation		88
Long. at laſt Obſervation	10° 4′	
Longitude by Account	14 21	
Diff. of Long. by Account	4 17=257Ms.	

The Mer. Diff. of Lat. by Account 69, and Diff. of Long. by Account 257, the Diſtance is 266 over 75°

To Diſtance 266, and Mer. Diff. of Lat, by Obſervation 88, the Diff. of Long. is 250. the true Difference of Longitude.

Now Long. at laſt Obſ. was	10° 4′W.
Diff. of Longitude 250	4 10′W.
Ship's true Longitude	14 14

Note. The neareſt Numbers correſponding to 266 and 88 in the Table, are found over 70 and 71 Degrees

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Monday, May 12th.
2	8		S. S. W.	N.W.bW. ½ W.		
4	8					Stiff Gales, and Showers till paſt Noon.
6	8	5				From 2 P. M. fair Weather, and moderate Gales.
8	8	5				
10	8	5				
12	8	5				
2	9					
4	6		S. by E. ¾ E.	S.W. ¼ W.	½	
6	5	5				
8	5	5				
10	5					
12	5					Variation 1 Point Weſterly per Amplitude.

Courſe.	Diſt.	S.	W	Lat. by D. R.	Lat. by Obſ.	Mer. Dif.	Dif. Lon.	Lon. in.	Bearing and Diſt.
S.	170	170		39.46	39.40	6° 38′		14° 14′ W.	Funchal S. 18° W. Diſt. 444 Miles.

Traverse Table.					
Courſes.	Diſt	N.	S.	E.	W.
S. by W.	118		115.7		23
S. S. E. ¼ E.	54		48.8	23.1	
			164.5	23.1	23
				23	
				0.1	

Proper Allowance being made for Variation and Lee-way, it appears from the Traverſe Table that the Ship has this Day made 164 Miles Southward, and no Departure; wherefore her direct Courſe has been South, and her Diſt. by D. R. 164. As ſhe has made no Departure, her Long. is the ſame as Yeſterday, and for her Latitude.

Yeſterday's Lat.		42°	30′W.
Diff. of Latitude by Account	164	2	44 S.
Preſent Lat. by Acc.		39	36 N.

But as by Obſervation the Ship is found to be in 39° 40′ North, it is plain ſhe has got 6 Miles a-head of the Dead Reckoning, which 6 Miles being added to the Diſtance by Dead Reckoning, in the true Courſe, Diſtance, Difference of Latitude, and Longitude of the Ship for this Day, will be as in their reſpective Columns.

Now a Parallel of Lat. through 39° 40′ in the Variation Chart cuts the Variation Lines of 11° 15′ in Long. 14° W. which confirms the Ship's Account of Longitude.

H.	K.	F.	Courſes.	Winds.	Lee-way.	Remarks on Board, Tueſday, May 13th.
2	8		S.S.W. ¾W.	NW.by N.	½	Freſh Gales and clear Wheather.
4	8					
6	8	5				
8	8	5				
10	8					People employed with the Boatſwain in mending the Mizen-top-ſail.
12	8	5				
2	8	4				
4	8	4				
6	8	6				
8	8	6				
10	8	5				
12	8	0				Variation ¾ Weſterly per Azimuth.

Courſes.	Diſt.	S.	W	Lat by D. R.	Lat. by Obſ.	Mer. Diff.	Dif. of Long.	Long. in	Bearing and Diſt
S. by W. half W.	192	184	56	36° 29′	36 36	7° 28′	1° 11′	15° 25′	Func. S. 19° W. Diſ. 252 M.

By examining it appears, that by the Dead Reckoning the Ship's Courſe this Day has been S. by W. her Diſt. 200 Miles, her Diff. of Lat. 191 Miles, and her Dep. 58 Miles; wherefore her Lat. and Long. by Account will be as follows:

Lat. from, or laſt Day's Lat.		39°	40′N.
Diff. Lat.	191	3	11 S.
Ship's Lat. by Account		36	29 N.
Sum Lat.		76	09
Middle Lat.		38	04
Com. Mid. Lat.		51	56

And to Com. Mid. Lat. 51° 56′, or 52°. and Departure 58, the Diff. of Long is 74 Miles.= 1° 14′W.
Long. from 14 14′W.
Long. in by Account 15 28 W.

But by Obſervation the Ship is found to be in 36° 36′ N. which, differing from the Lat. by Account, I correct as follows:

Yeſterday's Lat.	39°	40′N.
This Day's Lat. by Ob.	36	36 N.
True Diff. of Lat.	3	04=184 Miles
Sum Lat.	76	16
Mid. Lat.	38	8
Com. Mid. Lat.	51	52

To Courſe S. by W. half W. and Diff. Lat. 184, Diſt. is 192, Dep. 558, and to Mid. Com. Lat. 51° 52′ or 52°, and Dep. 55.8, the Diff. Long. is 71 M.
Diff. of Long.= 1° 17′W.
Long. at laſt Obſ. 14 14 W
Ship's true Long. 15 25W

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Wedneſday, May 14th.
2	4	3	W. by S. ¼ W.		½	Theſe 24 Hours moderate Weather with Rain.
4	4	5		S.by W. ½ W.		
6	4	7				
8	5		W. S. W. ½ W.			
10	5	2		S. ½ W.	½	
12	5	3				
2	5	5	W. S. W			
4	5	5		S.	½	
6	5	4				
8	5	1	S. W. by W.			
10	5			S. by E.	½	Variation ¾ P. W. per equal Altitudes of the Sun.
12	4	5				

Courſe.	Diſt.	S.	W.	Lat. by D. R.	Lat. by Obſ.	Mer. Diſt	Dif. of Long.	Long. in	Bearing and Diſt.
S. 65 W..	119	50	108	35. 52	35. 46	9° 62′	2. 13	17. 38W.	Funchal S. ¾E. Diſt 190 Miles.

TRAVERSE TABLE					
Courſes.	Diſt	N.	S.	E.	W.
W. by S. ¼ W.	27		4.0		26.7
W. S. W. ¼ W.	30		10.4		29.2
S. W. by W. ¾W.	43		18.4		38.9
S. W. ¾ W.	19		11.3		15.3
			44.1		110.1

Now to Diff. of Lat. 44.1 S. and Dep. 110.1 W. the Courſe is 68°, and Diſt. 119.

Laſt Day's Lat.	36°	36′W.
Diff of Lat.	0	44 S.
Lat. in by Account	35	52 N.
Sum Lats.	72	28
Mid. Lat.	36	14
Com. Mid. Lat.	53	46

And to Com. Mid. Lat. 53° 46′ or 54° and Dep. 110.1, the Difference of Longitude is 136= 2° 16′W.

Laſt Day's Long.	15	25 W.
Ship's Long. by Account	17	41 W.

But by Obſervation the Ship is found to be in Lat 35° 46′ N. differing from the Lat by Account 6 M. the Ship has got ſo much before the Reckoning, I correct as follows :

Yeſterday's Lat.	36°	36′N.
True Diff. of Lat.	0	50 S.
This Day's Lat. by Obſ.	35	46 N.
Sum Lat.	72	22
Middle Lat.	36	11
Com. Mid. Lat.	53	49

To Diſt. 119, and Diff. Lat. 50, Courſe is 65° Dep. 108, and to Co. Mid. Lat. 53° 49′ and Dep. 108, Diff. Long. is 133 M.=2° 13′W.

Long. at laſt Obſ.	15	25 W.
Ship's true Long.	17	38 W.

H.	K.	F.	Courſes.	Winds.	Lee-way.	REMARKS on Board, Thurſday, May 7th
2	4	6	S. by E. ¼ E.	S. W. ½ W.	½	Theſe 24 Hours moderate Gales and clear Weather.
4	4	8				
6	4	8				
8	4	8				
10	5		S. S. E.	S. W.	½	
12	5	2				
2	5	3				
4	5	5	S. S. E. ½ E.	S. W. by S. ½ W.	½	
6	5	5				
8	5	5				
10	5	6	S. E. by S.	S. W. by S.	½	Variation ¾ Point Weſterly.
12	5	4				

Courſe	Diſt	S.	E.	Lat. by D. R.	Lat by Obſ.	Mer. Diſt	Diff. of Long.	Long. in.	Bearing and Diſt.
S.35.30 E	135	110	78.5	34. 1N.	33.56	7.58	1.36	16° 2'W.	Funchal S. W. by S. W. 94 Miles.

TRAVERSE TABLE.

Courſes.	Diſt.	N.	S.	E.	W.
S. S. E. ¾ E.	48		41.2	24.7	
S. E. by ¼ E.	31		24.9	18.5	
S. E by S. ¾ E.	33		24.4	22.2	
S. E. ¼ E.	22		14.8	16.3	
			105.3	81.7	

Now to Diff. Lat. 105.3, and Dep 81.7, Courſe is 38° Diſt. 133 Miles.

Laſt Day's Lat.	35°	46'N.
Difference of Lat. 105 Miles =	1	45
Ship's Lat. by Account	34	01
Sum Lat.	69	47
Middle Lat.	34	54
Com. Mid. Lat.	55	6

And to Co. Mid. Lat. 55°, and Dep. 81.7, the Difference of Longitude is 100

100 Miles =	1°	40' E.
Long. at laſt Obſervation	17	38 W.
Ship's Long. by Acc.	15	58 W

But the Lat. by Obſervation differing 5 Miles from that by Account, I correct for the true Diff. of Long. as follows ;

Yeſterday's Lat.	35°	46 N.
This Day's Lat. by Obſ.	33	56
True Diff. Lat. 110 =	1	50
Sum's Lat.	99	4
Middle Lat.	34	51

To Diſt. 133, and Diff. Lat. 110, the Dep. 74.4.

Then 74.4+81.7=156, Half is 78, = true Dep.

Then to Diff. Lat. 110, and Dep. 78, the Courſe is S. 35° 30' E. Diſt. 135 M.

And to Co. Mid. Lat. 55° and Dep. 78,

the Diff. of Long. is 96 M. =	1°	36 E.
Long. at laſt Obſ.	17	38 W.
Ship's true Long.	16	02 W.

H.	K.	F.	Courſes.	Winds.	Leeway.	**Remarks** on Board, Friday, May 16th.
2	5	1	W. by N.	S. W. by S.	½	Theſe 24 Hours briſk Gales and for the moſt Part foggy. At 10 A. M. cleared up a little: ſaw Funchal, bearing S. W. by S. Diſt. 4 Leagues. At 10 P. M. came to Anchor off Funchal in 39 Fathoms. Variation ¾ Point.
4	5					
6	4	9				
8	4	5	S. by E.	S.W. by W.		
10	4	4				
12	4	8	S. by W.	W. by S.		
2	5	2				
4	5	2	S.W.byS. ½W.	N.N.W.½W.		
6	5	1				
8	5					
10	4	7				
12						

Saturday May 17th. Wind S. S. E. with Rain.	At 5 A. M. thinking we were too far to the Northward, hove up again, and gave the Ship a Sheer to the Southward, and anchored with the Beſt Bower in 35 Fathoms. At 3 P. M. veered away upon Beſt the Bower, and moored a Cable each Way, the Beſt Bower W. N. W. and the Small Bower to the Eaſtward; when moored, the Weſtermoſt Point W. by N. the Loo-Rock N. by W. Diſt about 1½ M. the Brazen-Head E. by S. the Deſerters from E. to S. E. Diſt. about 6 Lea. Wind S. E.
Sunday May 18th	Frequent Squalls with Rain. At 7 P. M. hard Gales from S. with a large Swell; got ſlip Buoy Ropes on the Cables, and all ready to put out to Sea. The People employed in knocking down the Beer Butts.
Monday May 19th.	More moderate and clear. Set up the Bobſtays, and ſtayed the Foremaſt; cleaned the Ship fore and aft, and looſed the Sails to dry. Wind E. by N.
Tueſday May 20th.	Sent ſundry Bales of Goods on Shore, and received ſome Wine. Anchored here the Weaſel Sloop and two India Ships. People employed in ſtowing the Wine. Wind E. S. E.
Wedneſday May 21ſt.	Continuing to get on Board the Wine. Came to anchor here his Majeſty's Ship Greenwich. Wind S. W.
Thurſday May 22d.	Got up the Top gallant Maſts and Yards, and bent the Topſails. Received on Board ſeveral Caſks of Water and other Proviſions for the Ship's Uſe. Wind W.
Friday May 23d.	At Day-light hove ſhort on the Small Bower, and made a Signal for the Viſiting Boat to come and clear the Ship. At 8 A.M. the Boat came; at half paſt 10 weighed with light Breezes, and ſtood out to Sea under an eaſy Sail waiting for the Betſy, Capt. Wier, Commander. At 11 ſhe came up, and we proceeded on our Return towards England. Wind N. by E.

A TABLE

Of the True Courſe, Diſtance, and Courſe to be ſteered by a Compaſs which varies 2 Points W. from the Downs, through the Britiſh Channel, to Sea. A Ship in the Downs to ſail,

True Courſe.	Courſe to ſteer.	Diſt. Miles.	Bearing and Diſtance from Capes, Headlands or Highlands, Iſlands, Rocks, Lighthouſes, &c.			Mil.
					by the Chart	
S.	S. S. W.	8½	S. Foreland, by Compaſs	W. N. W.	is W, Diſt.	2
S. W.	W. S. W.	20	Dengeneſs,	N. N. W.	is N. W.	3
S. W. by W. ¼ W.	W. by S. ¼ W.	32	Beachyhead,	N. N. E.	is N.	9
W. S. W. ½ W.	W. ½ N.	62	Dunnoſe	N.	is N. N. W.	15
			St. Catherine's Point,	N. by W. ½ W.	is N. W. by W. ½ W.	16
		33	Peveral Point,	N. by E.	is N. by W.	24
			C. la Hague,	S. W. by S.	is S. by W.	26
		26	Bill of Portland,	N. by E. ¾ E.	is N. ¼ W.	26
			Alderney I.	S. ¼ E.	is S. S. E. ¼ E.	21
			Caſkets (Rocks)	S. by W. ¾ W.	is S. ¼ E.	19
		12	Guernſey I.	S. by W.	is S. by E.	26
		38	The Start,	N. by S.	is N. by W.	19
		27	Eddeſtone Lighthouſe,	N. N. E.	is N.	24
			Ramhead,	N. N. E. ½ E.	is N. ½ E.	36
		58	The Lizard,	N. E.	is N. N. E.	30
			Land's End,	N. ½ E.	is N. by W. ¾ W.	36
	Total	316½	Uſhant I.	S. by W.	is S. by E.	58

The Britiſh Channel 290 Miles from the S. Foreland to the Lizard ; to ſail in the Fair Way 310.

Note. That Uſhant and the Lizard bear N. and S. of each other, Diſt. 28¼ Leagues, which is 85 Miles $=1^{\circ}\ 25'$; but the fair Way of the Channel between theſe Places, is at one Third of the Width of the Channel from the Engliſh Coaſt, which is in the Lat. 49° 30′ N. If you ſail in the Mid. Channel till you make the Start, you will have the Tide to ſet you towards the French Coaſt ; for in ſome Ports it ſets S. E. and S. S. E.

To find the true Amplitude by Calculation.

RULE. As the Sine Complement of the Latitude
Is to Radius,
So is the Sine of the Sun or Star's Declination
To the Sine of the true Amplitude;

Which is always of the ſame Name with the Declination, whether North or South.

EXAMPLE I.

On the 20th of October, 1777, in Latitude 51° 32′ N. I demand the true Amplitude?

As Sine Com. Lat. 51° 32′ 9.79383
Is to Radius —— 10.0000
So is Si. Sun's Dec. 10° 32′ S. 9.26199

To Si. of true Amp. 17° 5′ 9.46816

EXAMPLE II.

In Latitude 38° 25′ N. what is the Sun's true Amplitude when the Declination is 18° 59′. N.

As Sine Com. Lat. 38° 25′ 9.89405
Is to Radius 10.000000
So is Sun's Dec. 18.59 9.51227

To Sun's true Amp. 24° 32′ 9.61822

To find the true AZIMUTH.

The true Azimuth is an Arch of the Horizon, contained between the Meridian of the Place and the Azimuth Circle paſſing through the Centre of the Sun or Star at the Time of Obſervation; or it is the true Diſtance of the Sun or Star from the true North or South Points of the Compaſs.

The Magnetic Azimuth is the apparent Diſtance of the Sun or Star from the North or South Points of the Compaſs, either in the Forenoon or in the Afternoon when they are 5°, 10°, 15°, &c. above the Horizon, and is found in the following Manner:

Set the Box ſo that the four Cardinal Points of the Card ſtand oppoſite to the four Lines in the Compaſs Box: hold the Box in this Poſition, and move the Index, till the Sights being directed to the Sun or Star's Centre, the Shadow of the String joining the Sights fall directly along the Middle of the Index; then the Degree, &c. in the Arch intercepted between the End of the Index, next the Sun, and North Point of the Card, will give the Magnetic Azimuth required. If the Sun does not ſhine ſtrong enough to give a ſtrong Shadow, look through one of the Sights, and move the Index till one of the Strings cuts the Sun's Centre, and then the intercepted Arch,

Arch, as before, ſhews the Sun's Azimuth, and the like of the Star's.

When there is a rough Sea, the Obſervation is beſt made by two Perſons, and if the Card vibrates much, take the Middle Degree between the Limits which the Vibration reaches.

When the Azimuth is obſerved, the Altitude of the Object muſt be obſerved at the ſame Time.

Having the Latitude of the Place of Obſervation, and the Sun or Star's Declination, with the Altitude at the Time of Obſervation, the true Azimuth is found by the following

Rule. Add the Complement of the Latitude, the Complement of the Altitude, and the Sun or Star's Polar Diſtance into one Sum: from Half that Sum ſubtract the Polar Diſtance, and note the Half Sum and the Remainder; but if the Half Sum be leſs than the Polar Diſtance, then ſubtract it from the Polar Diſtance, and the Difference call the Remainder. Then add together,

The Secant leſs Radius of the Latitude,
The Secant leſs Radius of the Altitude,
The Sine of the Half Sum,
And the Sine of the Remainder into one Sum.

Half the Sum of theſe four Logarithms will give the Co-ſine of Half the true Azimuth, which being doubled, gives the true Azimuth, reckoned from the North in North Latitude, and from the South in South Latitude.

N. B. The Polar Diſtance of the Sun or Star, is their Diſtance from the neareſt or elevated Pole, and if the Latitude of the Place, and the Declination of the Sun or Star, be both North, or both South, then the Complement of the Declination is the Polar Diſtance; but if the Latitude and Declination be one North, and the other South, the Declination added to 90°, gives the Polar Diſtance.

EXAMPLE I.

In Latitude 43° 39′ N. the Sun's Altitude is obſerved to be 39° 28′, his Declination being then 16° 37′ North, required his Azimuth?

	90° 00′		90° 00′		90° 00′
Lat.	43 39	N. Alt.	39 28	Decl.	16 37 N.
Co. Lat.	46 21	Co. Alt.	50 32	Polar Diſ.	73 23

Note. The Secant leſs Radius (being the ſame as the Arithmetical Com. of the Co-Sine) is here uſed as being more familiar to the Generality of Seamen, and is found by omitting the firſt Figure in the Secant's Index. Thus the Secant of 43° 39′ is 10, 14052, and omitting the 1, in the Index leaves, 0, 14052, the Secant leſs Radius of 43° 39.′

Comp. Lat.	46 21	Secant leſs Radius of the Lat.	43° 39′	0.14052
Comp. Alt.	50 32	Secant leſs Radius of the Altitude	39 28	0.11239
Polar Diſt.	73 23	Sine Half Sum	85 08	9.99843
		Sine Remainder	11 45	9.30887
Sum	170° 16′			
		Sum of the four Logarithms		19.56021
Half Sum	85 8			
Sub. Po. Diſt.	73 23	Half the Sum Co-ſine	52° 56′	9.78010
Remainder	11 45	And 52° 56′ doubled, gives 105° 52′ for the Sun's true Azimuth to be reckoned from the North.		

E X A M P L E II.

In Latitude 42° 16′ N. the Sun's Altitude is obſerved to be 18° 40′, his Declination being then 7° 38′ S. required his Azimuth ?

	90° 00′		90° 00′		90′ 00′
Lat,	42 16 N.	Alt.	18 40	Decl.	7 38 S.
Co. Lat.	47 44	Co. Alt.	71 20	Po. Diſt.	97 38

Comp. Alt.	71 20	Secant leſs Radius of Lat.	42° 16′	0.13076
Polar Diſt.	97 38	Secant leſs Radius of Alt.	18 40	0.02347
		Sine of the Half Sum	108 21	9.97733
		Sine of the Remainder	10 43	9.26940
Sum	216 42			
		Sum of the four Logarithms		19.40096
Half Sum	108 21			
Sub.Po.Diſt.	97 38	Half the Sum is equal to Co-ſine	59° 53′	9.70048
Remainder	10 43	And 59° 53 doubled, gives 119° 46′ for the Sun's true Azimuth to be reckoned from the North.		

Having found the Sun's true Amplitude, or Azimuth, by the preceding Methods, and Magnetic Amplitude or Azimuth by Obſervation, it is evident that when they agree, there is no Variation ; but when they diſagree, then, if the true and obſerved Amplitudes be both of the ſame Name, that is, both North or both South, their Difference is the Variation ; but if the true and obſerved Amplitudes be of different Names, that is, one North and the other South, their Sum is the Variation ; again, if the true and obſerved Azimuth's be both on the Eaſt, or both on the Weſt Side of the Meridian, their Difference is the Variation ; but, if the true and obſerved Azimuth be one on the Eaſt, and one on the Weſt Side of the Meridian, their Sum gives the Variation ; and to know whether the Variation is Eaſterly or Weſterly, obſerve this general Rule, viz.

Let the Obſerver's Face be turned to the Sun, then, if the true Amplitude or Azimuth be to the Right Hand of the Magnetic, or obſerved, the Variation is Eaſterly, but if to the left Hand Weſterly.

EXAMPLE I.

Suppoſe the Sun's true Amplitude at Riſing is E. 13° 24′ N. and his Magnetic Amplitude E. 12° 32′ S. required the Variation and which Way?

Since the true Amplitude and obſerved, have different Names,
To the true Amplitude E. 13°24′N.
Add the Magnetic Am. E. 12 32 S.

The Sum is the Variation 25 56 W

which is Weſterly becauſe the true Amplitude is to the Left of the obſerved.

EXAMPLE III.

Suppoſe the Sun's true Azimuth is N. 32° 28′ Eaſterly, and his Magnetic Azimuth N. 8° 50′ W. required the Variation, and which Way?

Since they are on different Sides of the Meridian,
To the true Azimuth N. 32° 28′E
Add the Mag. Azim. N. 8 50W

Sum is the Variation 41° 18′

EXAMPLE II.

Suppoſe the Sun's true Azimuth in the Forenoon is N. 86° 40′ Eaſterly, but by the Compaſs it is N. 73° 24′ Eaſterly, required the Variation, and which Way?

Since the true and obſerved Azimuths are both on the ſame Side of the Meridian,
From the Greater N. 86° 40′E.
Take the Leſſer N. 73 24 E.

Remainder Variation 13 16 E.

which is Eaſterly, becauſe the true Azimuth is to the Right of the obſerved.

EXAMPLE IV.

Suppoſe the Sun's true Azimuth S. 17° 45′ E. and the Magnetic Azimuth S. 5° 48′ Weſt, required the Variation, and which Way?

Since they are on different Sides of the Meridian,
To the true Azimuth S. 17° 45′E.
Add the obſerved Azi. S. 5 48W.

Sum is the Variation 23 33 E.

The NEW METHOD of finding the Latitude at Sea, by taking two Altitudes, either in the Forenoon or Afternoon, having the intermediate Time meaſured by a Common Watch, with Eaſe and Accuracy, independent of the Sun's Meridian Altitude.

GENERAL RULES.

TO the Secant leſs Radius of the Latitude by Account, add the Secant leſs Radius, of the Sun's Declination, and call that Sum the Logarithm Ratio.

From the Natural Sine of the greateſt Altitude, ſubtract the Natural Sine of the leaſt Altitude, and find the Logarithm of their Difference, and write it under the Log. Ratio.

Subtract the Hours and Minutes when the Altitudes were taken from each other, and Half the Difference call Half-elapſed Time.

With Half the elapſed Time enter theſe Tables, and from the Column of Half-elapſed Time, take out the Log. anſwering thereto, and ſet it down under the Log. Ratio.

Add theſe three Logarithms together, and with their Sum enter the Tables, in the Column of Middle Time, where having found the Log. neareſt thereto, take out the Time correſponding to it, and put it down under Half the elapſed Time.

Subtract the Leſs from the Greater, and the Difference will be the Time from Noon, when the greateſt Altitude was taken.

With this Time enter the new Tables, and from the Column of Riſing, take out the Logarithm correſpending to it; from this Logarithm ſubtract the Log. Ratio, the Remainder will be the Logarithm of a Natural Number; which being found in any common Table of Logarithms, and added to the Natural Sine of the greateſt Altitude, will give the Natural Sine of the Sun's Meridian Altitude.

Having the Meridian Altitude of the Sun at Noon, the Latitude is found by the uſual Method.

N. B. If the Latitude found by the above Proceſs ſhould differ widely from the Latitude by Account, it will be proper to repeat the Operation: uſing the Latitude laſt found inſtead of the Latitude by Account, till the Reſult gives a Latitude nearly agreeing with the Latitude uſed in the Computation.

EXAMPLE. I.

Being at Sea in Latitude 46° 50′ N. by Account, when the Sun's Declination was 11° 17′, N. at 10 H. 2 M. in the Forenoon; the Sun's Altitude was 46° 55′, and at 11 H. 27 M. in the Forenoon; the Second Altitude was 54° 9′. Required the true Latitude, and the Time of the Day when the greateſt Altitude was taken.

Times

M. H. S.			
11 27 00	Lat. 46° 50′	Its Secant leſs Radius	0.16487
10 2 00	Dec. 11 17	Its Secant leſs Radius	0.00848
Ela. T. 1 25 00		Added gives the Log. Ratio	0.17335
½ El. Ti. 0 42 30			

The Sun's gr. Alt. at 11 H. 27 M. is 54° 9′ its Nat. Sine	81055
The Sun's leaſt Alt. at 10H 2 M. is 46° 55′ its Nat. Sine	73036
The Remainder or Diff. of Nat. Sines	8019

Log. Ratio	———	———	0.17335
The Common Log. of the Diff. N. S.		8019	3.90412
In the New Tables in Col. ½ Ela. Time for 42 M. 30 S. is			0.73429
Their Sum is the Log. of Middle Time			4.81176

		H. M. S.
The H. M. &c. for which by the New Tables is		1 15 30
Subtract Half-elapſed Time	———	42 30
The Difference is the true Space of Time the Sun had to riſe to the Meridian when the greateſt Altitude was taken.		0 33 00

	H. M.
Time per Watch	11 27
Sub. from	12 00
	00 33

Finding they agree, the Watch is right.

Enter the Tables with 33 M. under Col. of Riſing, and you will find the Log.	3.01488
From which Subtract the Log. Ratio	0.17335
The Natural Number of which is 694	2.84153
To the Natural Sine of the Sun's greateſt Altitude	81055
Add the Natural Number of the above Log.	694
The Sum is the Natural Sine of the Sun's Meridian Altitude 54° 50′	81749

90°

90° 00′
54 50

The Sun's Zen. Diſt 35 10 } By obſerving the Sun's Merid. Alt.
The Sun's Decl. 11 17 } the ſame Day the Latitude was
Latitude 46 27N. found to be 46° 28′ N.

EXAMPLE II.

Being at Sea in Lat. 47° 19′ N. by Account, when the Sun's Declination was 12° 16′ N. at 10 H. 24 M. A. M. per Watch, the Sun's Altitude was 49° 9′, at 1 H. 14 M. P. M. his Alt. was 51° 59′. Required the Latitude ?

12 0 Alt. Nat. S. Lat. 47° 19′ 0.16880
10 24 49° 9′ 75642 Sun's Dec. 12 16 0.01003
51 59 78783
1 36 Log Ratio 17883
1 14

Elap. T. 2 50 0 Diff. N. S. 3141 Its Log. 3·49707

½ El. T. 1 25 0 Its Log. in Col. of ½ Elap. Time is 0·44077

Sub. 0 15 0 Col. of Middle Time correſponding to 4.11667

Tr. T. 1 10 0 Its Log. in Column of Riſing is 3·66542
T.p.W. 1 14 0 Log. Ratio Sub. 0.17883

Wa. faſt 0 4 0 3066 the Nat. Number of this Log. 3·48659

N.S.Sun's gr.Alt. 78783 90 00

N.S.S. Mer.Alt. 81849=54 56

Sun's Zen. Diſt. 35 4
Sun's Decl. 12 16

Latitude in 47 20 North.

Here the Latitude found by Computation may be relied on, as it differs but one Mile from that uſed in the Operation.

EXAMPLE

EXAMPLE III.

Being at Sea in Lat. 50° 40′ North per Account, when the Sun's Declination was 20° 0′ S. at 10 H. 17 M. A. M. per Watch, the Sun's Altitude was found 17° 13′ and at 11 H. 17 M. A. M. per Watch, it was found 19° 41′. Required the Latitude?

	Times.	Alt.	Nat. S.			
	H. M. S.			Lat.	50° 40′	0.19803
				Decl.	20 00	0.02701
	10 17 0	17° 13′	=29599			
	11 17 0	19 41	=33682	Log. Ratio		0.22504
Ela. T.	1 0 0	Diff. N. S. 4083		Its Com. Log.		3.61098
½ El. T.	0 30 0	Its Log. from Col. ½ Elap. Time is				0.88430
	1 01 0	In Col. of Mid. Time correſponding to				4.72032
Tr. T.	0 31 0	From Noon its Log from Col. of Riſ.				2.96067
T. p. W.	0 43 0			Log. Ratio Sub.		0.22504
W. ſlow	0 12 0		544	N. Numb. of		2.73563
			33682	N. S. greateſt Alt.		
	90° 00′					
	20 01		34226	N. S. of Sun's Mer. Alt.		20° 1′
Zen. Diſt	69 59					
Decl.	20 00 S.					
Lat.	49 59 N.					

But as this Latitude differs 41 M. from that by Account, it will be proper to repeat the Operation, uſing the Latitude laſt found inſtead of the Latitude by Account.

	H. M. S.				
			Lat.	49° 59′	0.19178
½ Elapſed Time	0 30 00		Decl.	20 00	0.02701
	1 00 00				
			Log. Ratio		0.21879
True Time	0 30 00				3.61098
Time per Watch	0 43 00				0.88430
				H. M.	
Watch ſlow	0 13 00	In Col. Mid. Time		1 0	4.71397
True Time	0 30 00	Its Log. in Col. of Riſing is			2 93223
			Log. Ratio		0.21879
		517 Nat. Num. of			2.71344
		33682 Nat. S. great Alt.			
Nat. S. Sun's Mer. Alt		43199=20° 00′			

Zen. Diſt.	70 00
Decl.	20 00 S.
The Lat.	50 00 North

* The Latitude laſt found differing only one Mile from that uſed in the Operation, may be depended on as the true Latitude. Hence it is plain, that the Operation is repeated with very little additional Trouble, but few Alterations being neceſſary.

EXAMPLE IV.

Being at Sea in the Latitude of 60° 0′ North by Account, when the Sun was on the Equator, and conſequently had no Declination, at 1H. 0M. P. M. per Watch, his Altitude was 28° 53′, and at 3H. 0M. P. M. per Watch, it was 20° 42′. Required the true Latitude?

Times.				Lat.	60° 0′=0.30103
	H. M. S.	Alt.	N. S.	Dec.	00 00=0.00000
	1 00 00	28 53=48303			
	3 00 00	20 42=35347		Log. Ratio	0.30103
Elap. T.	2 00 00		12955	Its Log.	4.11244
½Elap. T.	1 00 00	Its Log. in Col. of ½ Elap. T.			0.58700
	2 00 00	Its Log. in Col. of Mid. T.			5.00047
T.fr.Nn.	1 00 00	Its Log. from Col. of Riſing			3.53243
T.p.Wa.	1 00 00			Log. Ratio	0.30103
			1704		3.23140
			48303		
N. S. of Sun's Merid. Alt.			50007=30° 00′ Sun's Merid. Alt.		
			60 00 Latitude		

The Latitude by Computation, coming the ſame with the Latitude by Account, ſhews that the Latitude by Account was right. From the foregoing Examples, it is plain, that the Operation is the ſame, whether the Sun hath North or South Declination. And it will be the ſame whether the Ship is in a North or South Latitude. It is alſo clear, that when the Sun has no Declination, the Arithmetical Complement of the Log. Co. Sine of the Latitude, or Secant leſs Radius, is the Log. Ratio.

EXAMPLE V.

July 5, 1778, wanting to go through the 8° of N. Channel, among the Maldives, and by Account being in Latitude 7° 20′ N. at 7 H. 25 M. 40 S. A. M. the true Altitude of the Sun's Centre, was 22° 30′, and at 10 H. 31 M. 48 S. A. M. it was found 63° 40′. Required the Ship's true Latitude.

Times

H. M. S. Alt. Nat. S. Lat. by Ac. 7° 20′ 0.00390
Times 10 31 48 63° 40′ 89623 D. July 5, 22 48 0.03533
7 25 40 22 30 38268
Log. Ratio 0.03923
Elap.T. 3 6 8 51355 Its Log. 4.71058
½El. T. 1 33 00 Its Log. in Col. of ½ Elap. Time is 0.40368
3 1 30 H. M. S.
3 1 30 5.15349
TrueT. 1 28 30 Its Log. in Col. of Riſing is 3,86709
T.p.W. 1 28 12 Log. Ratio 0.03923
Wat. ſl. 0 0 18 6728 Nat. Num. 3.82786
90 00 89623 Nat. ſ. gr. Alt.
Mer. Alt. 74 29
96351 N. S. Sun's Mer. Alt. 74° 29′.
Zen. Diſt 15 31
Decl. 22 48
Lat. in 7 17 North

N. B. As the Tables are only calculated to 30 Seconds, the Log. for any intermediate Seconds is found by taking the Difference between the Log. next greater and next leſs, and ſaying, as 30 Seconds is to that Difference, ſo is the given Seconds to the Difference of the Logarithms; or if it be any even Part, take ſuch a Part of the Difference, and apply it to the next leſs Logarithm.

SECOND OPERATION.

Lat. 7° 17′ 0.00352
Dec. 22 48 0.03533
Log. Ratio 0.03885
H. M. S. 4.71058
3 1 30 0.40368
H. M. S.
1 33 00 3 1 30 5.15321
True Time 1 28 30 3.86709
N. S. gr. Alt. 89623 Log. Ratio 0.03885
6734 N. Nu. Log. 3.82824
N.S.Sun'sMer.Al.96357=74 29 Hence the Lat. is 7° 17′ N.

The Latitude laſt found, agreeing with that uſed in the Operation, it may be taken as the true Latitude; and the Operation is repeated with very little additional Trouble, but few Alterations being neceſſary. Hence it is plain, that if you are miſtaken in the Latitude by Account, yet by repeating the Work two or three Times, making Uſe of the Latitude laſt found in the next Operation, it will at laſt diſcover itſelf to be true, by being equal to the laſt Suppoſition which evidently ſhews the Excellency of theſe New Tables.

To find the Latitude by the Planets.

In the Nautical Almanack find the Planet's Declination and Time of its Paſſage over the Meridian at Greenwich, reduce this Time to the Meridian of the Ship; having the Meridian Altitude and Declination, the Latitude is found in the ſame Manner as by the Sun or a fixed Star. The Declination is ſet down for every ſix Days, but may be eaſily found for intermediate Days, by taking proportional Parts. If the Altitude of the Moon be obſerved, it muſt be corrected, not only for the Dip and Semi-diameter, but alſo for the Horizontal Parallax, (by Table 2d, Page 88,) and the Declination reduced to the Ship's Meridian, have found the true Altitude and Declination. The Lat. is found in the ſame Manner as before. This method of finding the Latitude will be the more convenient, as the Moon, Jupiter and Venus, can be ſeen when the fixed Stars cannot be ſo well defined.

To find the apparent Time at Sea, and thereby to regulate the going of the Watch.

Among the Methods propoſed for this Purpoſe, that by equal Altitudes ſeems very fit to practiſe at Sea. At the Time when the Watch ſtands in need of being regulated for the Obſervations intended, the Ship lying by, let the Sun's Altitude be taken, at any convenient Time in the Forenoon, 3, 4, or 5 Hours diſtant from the Meridian, ſet down that Time and Altitude. In the Afternoon wait for the Sun's having the ſame Altitude exactly, (the Index of the Quadrant being already ſet to the Morning Altitude) and note down the Time; then half the Sum of theſe two Times is the apparent Time ſhewn by the Clock or Watch, when the Sun was upon the Meridian of that Place.

Leſt that an Altitude taken in the Forenoon cannot have a correſponding one in the Afternoon, by the interpoſition of Clouds, it is therefore proper to take ſeveral in the Forenoon, in order to have a greater Probability of ſecuring a correſponding one in the Afternoon; and if ſeveral Obſervations of equal Altitudes can be taken on both Sides of the Meridian, it will be beſt to find the Noon for each Pair, and take the Mean of all the Noons thus found for the true one.

EXAMPLE I.

May 20, 1781, at 8 H. 40M. Forenoon, and at 8H. 16 M. Afternoon, by Watch, the Sun had equal Altitudes. Required the going of the Watch?

	M. M.
Now add together	12 00
	8 40
	3 16
Take half the Sum	23 56
Gives app. Noon	11 58
Noon per Watch	12 00
Watch too faſt	2

March 18, 1781, being in Lat. 49° N. at 8 H. 10 M. 58 S. Forenoon, and at 3H. 58M. 34S. Afternoon, I had equal Altitudes of the Sun. How did the Watch go?

	H.	M.	S.
Add together	12	0	0
	8	10	58
	3	58	34
Take half the Sum	24	9	32
Gives the app. Noon	12	4	46
Noon per Watch	12	0	00
Watch too ſlow		4	46

Another Method of finding the apparent Time at Sea.

With a good Hadley's Quadrant, well adjuſted, take the Altitude of the Sun's lower Limb; take the Difference between the Sun's Semi-diameter, found in Page 3d of the Month in the Ephemeris, and the Dip of the Horizon, and add to it the obſerved Altitude of his lower Limb, and you have the apparent Altitude of his Centre.

From which ſubtract the Correction of his Altitude, as found in the Table for that Purpoſe, and the Remainder will be the true Altitude of his Centre; hence the true Zenith Diſtance.

Find the Ship's Latitude and Longitude by Account, at the Time of Obſervation, by carrying the Reckoning forward to that Time.

Find the Sun's Declination in Page 2 of the Month in the Ephemeris; correct this Declination by the Ship's eſtimated Longitude, and Time from Noon of the Obſervation; with this correct Declination find the Polar Diſtance, by adding it to 90°, when the Latitude and Declination are one North, and the other South; but if both North or South, ſubtracting the Declination from 90°, gives the Sun's Diſtance from the elevated Pole. Then,

Add together the Ship's Co. Latitude, the Polar Diſtance, and Zenith Diſtance.

From half their Sum ſubtract the Zenith Diſtance, noting the ſaid half Sum and the Difference.

Then to the Arithmetical Co. of the Co-Sine of the Latitude, add the Arithmetical Co-Sine of the Polar Diſtance, and the Logarithms of the Sines of the half Sum and the Difference.

Half the Sum of theſe four Logarithms is the Co. Sine of half the Hour Angle, which being doubled, gives the Hour Angle, or Diſtance of the Sun from the Meridian.

This Angle being turned into Time, by allowing one Hour to every fifteen Degrees, &c. gives the apparent Time at the Ship, if it be in the Afternoon; but if it be in the Forenoon, the Complement to 24 gives the apparent Time, counted from the preceding Noon.

EXAMPLE I.

Suppoſe a Ship at Sea in Latitude 39° 54′ N. and Longitude 35° 30′ W. of Greenwich, by Account, on the 7th of May, 1781, at 5H. 30 M. P. M. by Watch, the Altitude of the Sun's lower Limb was found 15° 45′, by a Fore Obſervation, the Eye being 18 Feet above the Water. What was the true apparent Time at taking the Obſervation ?

Ob. Alt. S.'s lower Limb	15° 45′ 00″	Ship's Lat.	39° 54′ N.
Sun's Semi-di. 15′ 53″		Com. Lat.	50 6
Dip for 18 Feet 4 3			H. M.
Diff. Semi-di. and Dip	11 50	Time at Ship by Watch	5 30
		Long. by Acc. 35° 30′ =	2 22
	15 56 50		
Correction from Table	3 8	App. Ti. at Green. by Wa.	7 52
Sun's true Alt.	15 53 42		
Sun's true Zen. Diſt.	74 6 18		

The Sun's Declina.	May 17th at Noon	by the Ephemeris is	16° 59′ 32″ N
	May 8th		17 15 46 N
The Daily Difference or Increaſe is			16 14

Then, by the Rule of Three, as, 24H. : 16′ 14″ :: 7H. 52M. : 5′ 19″, which added to 16° 59′ 32″, the Sun's Declination the preceding Noon, gives 17° 4′ 51″, the Sun's true Declination at the Time and Place of Obſervation; which being ſubtracted from 90°, leaves 72° 55′ 9′, the Polar Diſtance. Then add together the

Co. Lat.	50° 6′ 0″	Co. Lat.	50° 6′ 0″	Ari. Co. Si.	0.11511
Pol. Diſt.	72 55 9	Pol. Diſt.	72 55 9	Ar. Co. Si.	0.01960
Zen. Diſt.	74 6 18	Half Sum	98 33 43	Log. Si.	9.99513
		Remainder	24 27 25	Log. Si.	9.61701
Sum	197 7 27				
		Sum of the four Logs.			19.74685
Half Sum	98 33 43				
Zen. Diſt.	74 6 18	Co-ſi. half the hor. An.	41 39		9.87342
			2		
Diff.	24 27 25				
		The hor. Angle	83 18, which being		

divided

divided by 15 (or more briefly by the Table for turning Degrees into Time) gives 5H. 33M. 12S. the true Time when the Obſervation was made, ſo the Watch was 3 Minutes, 12 Seconds too ſlow. In like Manner may the Time be found by the Sun as often as convenient; and if ſeveral Altitudes are taken, noting the Time by the Watch, the Mean of theſe Times and Altitudes will be preferable to a ſingle Obſervation.

If there is Reaſon to believe that the Watch gains or loſes conſiderably in a Day, other Sets of Obſervations ſhould be taken on ſucceſſive Days, whereby the Daily Variation of the Watch may be found and allowed for; and then the Artiſt will have little more to do in finding his Longitude by Obſervation, than to reduce the obſerved Diſtance of the Objects to the true Diſtance of their Centres, the Ship's Time being ſhewn by the Watch regulated as before. The Time may alſo be found by obſerving the Altitude of a Star; but not being ſo convenient as the obſerving the Altitude of the Sun, it is here omitted.

Note. The Logarithms for Degrees, Minutes, and Seconds, is found by taking the Difference between the Logarithms of the next Greater, and next Leſs than the given Number, and ſaying, as 60 Seconds : is to that Difference :: ſo is the Seconds given : to a fourth Number; which fourth Number being added to the Right Hand of the next leſs Logarithm, gives the Logarithm required. By the Reverſe of this, when the Logarithm is given, the Seconds may be found; but if the given Seconds be $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, or nearly any other even Part of a Minute, the like Parts of the Difference of the Logarithms may be taken and added to the next leſs Logarithm, and that will be the Logarithm of the Degrees, Minutes, and Parts of a Minute required. The ſame may be obſerved of Natural Sines. When the Logarithms for Sines, Tangents, or Secants, are required for more than 90° ſubtract the given Degrees and Minutes from 180, and take the Logarithm of the Remainder, and that will be the Logarithm required.

The Sun ſhould be, at leaſt, 3 or 4 Points of the Compaſs from the Meridian when his Altitude is taken to find the Time, aud the nearer the Eaſt or Weſt Points the better.

To take the Obſervations neceſſary for finding the Longitude at Sea.

The Capital Obſervation for this Purpoſe is, that of the Diſtance of the Moon from the Sun, or ſome remarkable Star not far from the Zodiac. In Order to make ſuch Obſervations, the Obſerver muſt be furniſhed with a Watch that can be depended upon for keeping

Time, within a Minute for ſix Hours; and with a good Hadley's Quadrant, or rather Sextant, which is preferable to a Quadrant. The Inſtrument will ſtill be more fit for the Purpoſe, if it be furniſhed with a Screw to move the Index gradually and ſteadily; an additional dark Glaſs, lighter than the common Screens, to take off the Glare of the Moon's Light, in obſerving her Diſtance from a fixed Star; and a ſmall Teleſcope magnifying three or four Times, to render the Contact of the Star with the Moon's Limb, more diſcernible; a Magnifying Glaſs of 1½ or 2 Inches Focus will aſſiſt the Obſerver to read off his Obſervation with greater Eaſe and Certainty.

The Obſerver muſt, in the firſt Place, examine his Inſtrument with the greateſt Care, and adjuſt it with the utmoſt Exactneſs poſſible; which done, let him proceed to his Obſervation as follows:

If the Diſtance of the Moon from the Sun is to be obſerved, turn down one of the Screens, look at the Moon directly through the tranſparent Part of the Horizon-glaſs, and keeping her there, gently move the Index till the Sun's Image is brought into the ſilvered Part of that Glaſs, bring the neareſt Limbs of both Objects into Contact, and let the Quadrant librate a little on the Lunar Ray, whereby the Sun will appear to riſe and fall by the Side of the Moon; in this Motion the neareſt Limbs muſt be made to touch one another exactly, by moving the Index; when this is effected, the Obſervation is made; and the Diviſion cut by the Vernier Scale will ſhew the Diſtance of the neareſt Limbs of the Objects.

If the Diſtance of the Moon from a Star is to be obſerved, when the Moon is very bright, turn down the lighteſt Screen, or uſe a dark Glaſs, lighter than the Screens, and deſigned for this particular Purpoſe; look at the Star directly through the tranſparent Part of the Horizon-glaſs, and keeping it there, move the Index, till the Moon's Image is brought into the ſilvered Part of the ſame Glaſs; let the Quadrant librate gently on the Star's Ray, and the Moon will appear to riſe and fall by the Star; between the Librations move the Index, till the Moon's enlightened Limb is exactly touched by the Star, then the Obſervation is made.

The Quadrant is to be held as for a fore Obſervation, and its Plane muſt always be made to paſs through the two Objects whoſe Diſtance is to be obſerved, and for that Purpoſe muſt be put into various Poſitions, according to the Situation of the Objects, which will be rendered familiar by a little Experience.

At the very Inſtant, or at moſt within a very few Seconds of the Time, at which the Obſerver gives Notice of completing his Obſervation, ſomebody muſt obſerve the Hour, Minute, and Quarter Minute (if there be no Second Hand) to the Watch, uſed for finding the apparent Time; and at the ſame Inſtant of the Obſerver's giving the

the aforeſaid Notice, or at the utmoſt within a Minute of that Time; two Aſſiſtants muſt take the Altitudes of the two Objects, whoſe Diſtance is obſerved; all which being done, the Obſervations neceſſary for aſcertaining the Longitude are completed.

An Obſerver who uſes the Ephemeris, muſt obſerve the Moon's Diſtance from ſome of thoſe Stars only, whoſe Diſtance from her is ſet down in the Ephemeris, and the Diſtances there ſet down afford him a ready Means of knowing the Star from which her Diſtance ought to be obſerved; for he has nothing to do but to ſet his Quadrant to the Diſtance computed roughly at the apparent Time eſtimated nearly by the Meridian of Greenwich, and look to the Eaſt or Weſt of the Moon, according as the Diſtance at Grenwich is found in the 8th or 9th, or in the 10th or 11th Pages of the Month, and having found the Moon upon the Horizon-glaſs, let him give a ſweep with his Quadrant to the Right or Left, and he will find the Star he wants, if it be above the Horizon, and the Air be clear, in nearly a Line perpendicular to the Line joining the Moon's Horns, or, which is the ſame, in the Line of the Moon's ſhorter Axis produced.

The Time at Greenwich is eſtimated nearly by turning the Ship's ſuppoſed Longitude from Greenwich into Time, and adding it to, or ſubtracting it from, the apparent Time at the Ship; as the Ship is Eaſt or Weſt of Greenwich; and the Diſtance of the Moon from the Star, at this Time, is found roughly, by ſaying, as 180 Minutes, the Number of Minutes in three Hours, is to the Difference in Minutes (neglecting Seconds) between this nearly eſtimated Time, and the next preceding Time ſet in the Ephemeris; ſo is the Difference in Minutes between the Diſtances in the Ephemeris, ſet down for the next preceding Time, and the next following Time, to a Number of Minutes, which added to, or ſubtracted from, the Diſtance ſet down for the ſaid preceding Time, according as it is increaſing or decreaſing, gives the Diſtance nearly at the Time the Obſervation is made, and to which the Quadrant or Sextant is to be ſet.

To reduce the Obſerved, or Apparent Diſtance of the Moon's Limb from a Star, or from the Sun's Limb, to the true Diſtance of their Centres, and to find the Longitude of the Ship from Greenwich.

To the apparent Time of the Obſervation at the Ship, apply the Longitude turned into Time, by Subtraction or Addition, according as the Ship is Eaſt or Weſt of Greenwich; this gives the apparent Time of the Obſervation, which call the *reduced Time.*

In

In Page the 7th of the Month in the Ephemeris, ſeek the neareſt Noon or Midnight preceding the reduced Time; and alſo the neareſt Noon or Midnight following it; always taking the neareſt to the reduced Time, both before and after it, whether Noon or Midnight.

Write down the Moon's Semi-diameter, and horizontal Parallax, for the preceding Noon or Midnight, and alſo for the following Noon or Midnight; and find the Difference between the two Semi-diameters, and between the two Parallaxes: The firſt of theſe Differences is the Variation of the Semi-diameter in 12 Hours; and the ſecond, the Variation of the Horizontal Parallax in 12 Hours; then ſay, as 12 Hours is to the Difference between the reduced Time and the preceding Noon or Midnight, ſo is the Variation of the Semi-diameter in 12 Hours to a fourth Proportional, and ſo is the Variation of the horizontal Parallax in 12 Hours to a fourth Proportional; theſe Fourths applied reſpectively to the Semi-diameter and Parallax for the preceding Noon or Midnight, by Addition or Subtraction, according as the Semi-diameter and Parallax are increaſing or decreaſing, gives the Moon's horizontal Semi-diameter and Parallax for the reduced Time.

To the Moon's horizontal Semi-diameter for the reduced Time, add the Correction anſwering to her obſerved Altitude, taken from the Table; (1ſt. Page 86.) the Sum is the true apparent Semi-diameter, at the Time and Place of Obſervation.

To the obſerved Diſtance of the Moon's Limb from a Star, apply the Moon's true apparent Semi-diameter, juſt found by Addition or Subtraction, according as the Limb neareſt to, or fartheſt from, the Star, was obſerved, and you will have the apparent Diſtance of the Moon's Centre from the Star. But to the obſerved Diſtance of the Sun and Moon's neareſt Limbs, add the Sum of the Sun's Semi-diameter, taken from Page 3d of the Month in the Ephemeris, and the Moon's true apparent Semi-diameter juſt found, and you will have the apparent Diſtance of their Centres.

Take the Difference between the Sun's Semi-diameter found in the Ephemeris, and the Dip of the Horizon, and add to it the obſerved Altitude of the Sun's lower Limb, but ſubtract from the obſerved Altitude of his higher Limb, and you will have the apparent Alt. of his Centre. Take the Difference between the Moon's true apparent Semi-diameter and the Dip, and add to it the obſerved Altitude of her lower Limb, but ſubtract it from the obſerved Altitude of her higher Limb, and you will have the apparent Altitude of her Centre; and ſubtract the Dip from the obſerved Altitude of a Star, and you will have its apparent Altitude.

From the apparent Altitude of the Sun's Centre ſubtract the Correction to that Altitude, taken from the Table (1ſt. Page 86.) and you will have its true Altitude; to the apparent Altitude of the Moon's Centre,

Centre, add the Correction to that Altitude, and her horizontal Parallax at the reduced Time, taken from the Table (page 88) and you have the true Altitude; and from the apparent Altitude of a Star, ſubtract its Refraction, taken from the Table, (page 31.) and you will have its Altitude. Theſe Preparations being finiſhed, proceed to reduce the obſerved Diſtance to the true Diſtance as follows:

1ſt. To the natural Co-ſine of the Difference of the apparent Alts. of the Moon and Object from which her Diſtance was obſerved, apply the natural Co-ſine of the apparent Diſtance of their Centres, by Subtraction or Addition, according as the Diſtance is leſs or greater than 90°, and find the Logarithm of the Remainder or Sum.

2dly. To this Log. add the Logarithmic Co-ſines of the true Altitudes of the Objects.

3dly. And from this Sum ſubtract the Sum of the Co-ſines of the apparent Altitudes; and find the natural Number correſponding to the Remainder: The Difference between this Number and the natural Co-ſine of the Difference of the true Altitudes of the Objects, is the natural Co-ſine of the true Diſtance.

In the Ephemeris, among the Diſtances of the Objects on the Day of Obſervation, ſeek for this computed Diſt. and if it be there, the Time of Obſervation at Greenwich is at the Top of the Columns above it; but if the computed Diſtance falls between two Diſtances in the Ephemeris, as it generally will, then ſay, as the Difference between the two neareſt Diſtances in the Ephemeris, is to 3 H. ſo is the Difference between the firſt of theſe Diſtances and the computed Diſtance to the Time, which added to the Time ſtanding over the ſaid firſt Diſtance in the Ephemeris gives the true Time of the Obſervation of the Objects by the Meridian of Greenwich.

The Difference between this Time and the Time of the Obſervation at the Ship, being turned into Longitude, gives the Ship's Longitude from Greenwich, E. or W. according as the Time at the Ship is greater or leſs than that at Greenwich.

E X A M P L E I.

Being at Sea, July the 27th, 1778, in Long. 20° 30′ Weſt of Greenwich, by Account at 6 Hours 30 Minutes P. M. by a Watch well regulated before by the Sun's Altitude, I obſerved the Diſtance of the Sun and Moon's neareſt Limbs 49° 21½′, and at the ſame Inſtant two Aſſiſtants obſerved, the one the Altitude of the Sun's lower Limb 5° 8½′, and the other the Altitude of the Moon's lower Limb 42° 18′, the Height of the Eye being 18 Feet above the Sea. Required the Ship's true Longitude?

M H. M.

	H.	M.
Apparent Time at Ship	6	30
Ship's Long. Weſt of Greenwich, by Acc. 20° 30′	1	22
Reduced Time	7	52

In the Ephemeris for July 27, 1778.

The Mn's hor. Par. at Noon is	57′ 32″	Semi-diam.	15′ 41″
At Midnight	57 5		15 33
Decreaſe in 12 Hours	27		8

Then as 12 Hours : 27″ : : 7 H. 52 M. : 18″, and becauſe the horizontal Par. is decreaſing 57′ 32″—18″=57′ 14″, the Moon's horizontal Par. at the reduced Time.

And as 12 H. : 8 S. : : 7 H. 52 M. : 5 S. and as the Semi-diameter is decreaſing 15′ : 41″—5″=15′ 36″, the Moon's Semi-diameter at the reduced Time.

Moon's horizontal Semi-diameter, for reduced Time		15′	36″
Correction from Table I. Page 86, for Altitude 42° 18			11
Moon's true apparent Semi-diameter		15	47
Sun's ditto		15	48
Sum of the Sun and Moon's Semi-diameters		31	35
Ob. Diſt. of the Sun and Moon's neareſt Limbs	49	21	30
App. Diſt of the Sun and Moon's Centres	49	53	5

						′	″
Sun's App. Semi-dia.		15′	48″	M's tr. App. Semi-dia.		15	48
Dip for 18 Feet		4	3	Dip		4	3
Diff.		11	45	Diff.		11	45
Obſ. Alt. Sun	5°	8	30	Ob. Alt. M's. lo. Li.	42	18	00
App. Alt. Sun's Cen.	5	20	15	App. Alt. M's Cen.	42	29	45
Corr. from Table I.		9	17	Cor. from Table II.		41	9
Corr. Alt. S's Cent.	5	10	58	Tr. Alt. M's Cent.	43	10	54
				Sun's ditto	5	10	58
Moon's App. Alt.	42	29	44				
Sun's ditto	5	20	15	Diff. tr. Alts.	37	59	56
Diff. of App. Alts.	37	9	29				

Nat.

Nat. Co-ſine Diff. App. Alt. 37° 9′ 30″=79697
Nat. Co-ſine App. Diſt. 49 53 5 =64433
Diff. of Nat. Co Sines 15264 its Log. 4,18367
Add } Log. Co-ſine S's tr. Alt. 5 10 58—9,99822 }
Sum } Log. Co-ſi. M's tr. Alt. 43 10 54—9,86284 } 19,86106

24,04473
Sub } Log. Co-ſine S's ap. Alt. 5 20 15—9,99812 }
Sum } Log. Co-ſi. M's ap. Alt. 42 29 45—9,86766 } = 19,86578

Natural Num. of Remainder 15089 its Log. 4,17895
Nat. Co-ſi. Diff. tr. Altitudes 37 59 56 78807

Nat. Co-ſi. true Diſt. 50 25 5 — 63718

By the Ephemeris, in Page the 10th of the Month, I find that on July the 27th,

The prec. neareſt Diſt. at 6 H. is 49 34 43 Prec. Diſt. 49 34 43
The following near. Diſt. at 9 is 51 6 10 Compu. Diſt. 50 25 5

1 31 27 0 50 22

Then as 1° 31′ 27″ : 3 H. :: 50′ 22″ : 1 H. 39 M. 8 S. which being added to 6 Hours, the Time ſtanding over the next preceding Diſtance, gives 7 H. 39 M. 8 S. the true Time at Greenwich. The Time at Ship was 6 H. 30 M. the Difference 1 H. 9 M. 8 S. which being turned into Longitude by allowing 15° for 1 H. &c. gives 17° 17′, and is Weſt, becauſe the Time at Ship is leſs than at Greenwich.

EXAMPLE II.

Being at Sea, May 4th, 1778, in Lat. 33° 43′ N. and Long. 45° W. by Account, at 10 H. 30 M. P. M. by a Watch well regulated before by the Sun, I obſerved the Diſtance of the Moon's fartheſt Limb from the Star Spica, to be 50° 28′, and at the ſame Time two Aſſiſtants obſerved, one the Altitude of the Moon's lower Limb 24° 18½′, and the other the Altitude of Spica, 45° 13¼′; theſe Obſervations were made with Hadley's Quadrants well adjuſted, the Height of the Eye above the Water being 18 Feet. Required the Longitude the Ship is in?

		H.	M.	S.
True Apparent Time at Ship		10	30	0
Ship's Long. W. of Greenwich, by Account	45	3	0	0
Reduced Time		13	30	0

Now as this Time is ſo near Midnight, the Moon's Semi-diameter and horizontal Parallax may be taken for Midnight. Therefore, May 4th, the Moon's horizontal Parallax at Midnight is 56′ 55″, and Semi-diameter 15′ 30″.

	D.	M.	S.
Moon's true hor. Semi-diameter for reduced Time		15	30
Correction from Table I. for obſ. Alt. 24° 18′ 30″,			7
Moon's True Apparent Semi-diameter	0	15	37
Obſerved Diſt. Moon's fartheſt Limb from Spica	50	28	0
Apparent Diſt. of Moon's Centre from Spica	50	12	23

Spica's obſ. Alt.	45°	13′	15″	Moon's Tr. app. Semi-di.		15′	37″
Dip for 18 Feet		4	3	Dip for 18 Feet		4	3
	45	9	12	Difference		·11	34
Refr. for that Alt.			57	Moon's obſ. Alt. low. Lim	24	18	30
Spica's true Alt.	45	8	15	App. Alt. Moon's Centre	24	30	4
				Corr. from Table II.		49	43
Spica's App. Alt.	45	9	12				
Moon's App. Alt.	24	30	4	True Alt. Moon's Cen.	25	19	47
				Spica's true Alt.	45	8	15
Diff. App. Alts.	20	39	8				
				Diff. true Alts.	19	48	28

Nat. Co-ſi. Diff. App. Alts.	20°	39′	8″	93574	
N. Co-ſi. app. Diſt. Moon & Star	50	12	23	64003	
Diff. Nat. Sines				29571 its Log.	4,47086
Add } Co-ſine Star's true Alt.	45°	8′	15″	9,84844 }	=19,80454
Sum } Co-ſine Moon's tr. Alt.	25	19	47	9,95610 }	
					24,27540
Sub. { Co-ſine Star's app. Alt.	45	9	12	9,84832 }	=19,80734
Sum { Co-ſine Moon's ap. Alt.	24	30	4	9,95902 }	
Nat. Number of Remainder				29380	4,46806
Nat. Co-ſine Diff. true Alts.	19	48	28	94083	
Nat. Co-ſine true Diſt. Moon and Star				64703 = 49° 40′ 55″	

Now in Page the 9th of the Month in the Ephemeris, I find that on May the 4th, 1780,

The prec. near. Diſ. at 12 H. is	50°	30′	46″	Prec. Diſ.	50°	30′	46″
The foll. neareſt Diſt. at 15 is	48	54	46	Comp. Diſt	49	40′	55″
Diff. in 3 Hours	1	36	0	Diff.	0	49	51

Then

Then 1 H. 36 M. : 3 H. :: $49' 51''$: 1 H. 33 M. 28 S. which added to 12 Hours, the Time ſtanding over the next preceding Diſtance, gives 13 H. 33 M. 28 S. the Time of the Obſervation at Greenwich.

	H.	M.	S.
The Time at the Ship was	10	30	0
Time at Greenwich	33	33	28
Diff. betw. Ship and Green	3	3	28

Then, as 1 H. : 15° :: 3 H. 3 M. 28 S. : 45 52 Hence the true Longitude is 45 52 and is Weſt, becauſe the Time at the Ship is leſs than at Greenwich.

In Order to obtain a greater Degree of Exactneſs, it will be better to repeat the Obſervations of the ſame Objects, till at leaſt three Diſtances and their correſponding Altitudes and Times be obtained. The Mean of theſe Times, Diſtances, and Altitudes may be depended on with greater Certainty than any ſingle Obſervation.

The beſt Time of the Day for taking the Diſtance between the Moon and Sun, is from about Half an Hour before Sun-riſe to about Ten o'Clock in the Morning; and in the Afternoon from about Two o'Clock to within Half an Hour before Sun-ſet. Theſe Obſervations may be taken the four Days preceding the Moon's firſt Quarter and the four Days following the laſt Quarter.

The beſt Time for making Obſervations between the Moon and a Star, is during the Evening and Morning Twilight, or when the Sea Horizon can be ſeen diſtinct enough to take an Altitude ſufficiently accurate, and when the Moon has about 5°, 10°, or not exceeding 20° of Altitude, although any Altitude may be uſed with a diſtinct Horizon.

A Readineſs in the Uſe of the Quadrant in obſerving the Diſtance is only to be attained by Practice, which the Learner may make familiar to himſelf by obſerving the Poſitions of Land Objects; and, to obtain an Accuracy in the Obſervations, let him ſelect 6, 8, 10, or more Objects lying round his View; and beginning with any One of them, take the angular Diſtance of the Firſt and Second, of the Second and Third, of the Third and Fourth, &c. and the Sum of all theſe Angles ſhould be juſt 360 Degrees.

In finding the Longitude the Obſerver muſt be well acquainted with the Uſe of the Logarithms, which he may find in any common Book of Navigation, and are therefore here omitted, as they would greatly enhance the price of this Book, and the Uſe of Hadley's Quadrant, and how to adjuſt it, or to find out the Error of Adjuſtment and allow for it, which may be done thus: Suppoſe he meaſures the Sun's Diameter twice, with the Index placed alternately before and behind the beginning of the Diviſions, and finds one to be $30'$ and the contrary Way $33''$ half the Difference $1\frac{1}{2}$, will be the Correction of Adjuſtment, which muſt be added if O on the Index ſtands before O on the Quadrant, but if behind, it muſt be ſubtracted from all Obſervations made.

TABLE

TABLE I.

A Table of Corrections for reducing the Moon's Semi-diameter to the true Semi-diameter; and alſo a Table for reducing the Sun's Altitude to the true Altitude from the Earth's Centre.

Apparent Altitude.	Cor. to be added to the Moon's app. Semi-di.	Cor. to be ſubt. from the Sun's Altitude.		Apparent Altitude.	Cor. to be added to the Moon's Semi-diame.	Cor. to be ſubt. from Sun's Alt.
°	″	′	″	°	′	″
0	0	32	51	45	11	51
1	0	24	20	46	12	49
2	1	18	26	47	12	47
3	1	14	27	48	12	45
4	1	11	42	49	12	43
5	1	9	45	50	12	42
6	2	8	19	51	12	40
7	2	7	11	52	13	39
8	2	6	20	53	13	37
9	2	5	39	54	13	36
10	3	5	6	55	13	35
11	3	4	38	56	13	33
12	3	4	14	57	13	32
13	4	3	54	58	14	30
14	4	3	36	59	14	29
15	4	3	21	60	14	28
16	4	3	8	61	14	27
17	5	2	55	62	14	26
18	5	2	45	63	14	25
19	5	2	35	64	14	24
20	5	2	27	65	14	22
21	6	2	19	66	15	21
22	6	2	12	67	15	20
23	6	2	6	68	15	19
24	7	2	0	69	15	18
25	7	1	54	70	15	17
26	7	1	48	71	15	16
27	7	1	43	72	15	15
28	8	1	39	73	15	14
29	8	1	34	74	15	14
30	8	1	30	75	15	13
31	8	1	27	76	16	12
32	8	1	23	77	16	11
33	9	1	20	78	16	10
34	9	1	17	79	16	9
35	9	1	14	80	16	8
36	9	1	11	81	16	8
37	10	1	9	82	16	7
38	10	1	6	83	16	6
39	10	1	3	84	16	5
40	10	1	1	85	16	4
41	10		58	86	16	3
42	11		56	87	16	3
43	11		54	88	16	2
44	11		53	89	16	1
45	11		51	90	16	0

The Corrections of the Moon's Semi-diameter are the natural Sines of her Altitude, the Radius being 16, which is nearly the Moon's mean Semi-diameter, and are to be added, becauſe in aſcending from the Horizon to the Zenith, ſhe approaches nearer to the Obſerver by a Semi-diameter of the Earth, or about one ſixtieth Part of her Diſtance from the Earth.

The Corrections of the Sun's Altitude are the Difference between the Refraction at each Degree of Altitude and his Parallax at that Altitude, and is to be ſubtracted from the apparent Altitude.

The Corrections are only ſet down for Degrees, but may be found for any intermediate Minutes, by taking proportional Parts, or ſaying as 60 is to the Difference between the next greater and next leſs Correction, ſo is the Minutes given to a fourth Number, which being ſubtracted from the Correction of the next leſs Altitude, gives the Correction required.

Thus the Corrections of Sun's Altitude for 5° 20′ is required?

For Altitude 5° the Correction is	9′ 45″
6 the Correction is	8 19
The Differences	1 26

Then, as 60′ : 1′ 26 :: 20′ : 29″, which ſubtracted from 9′ 45″ leaves 9′ 16″, the Correction for 5° 20′ Altitude; or if the Third of the Difference be taken and ſubtracted as above, it will be the ſame.

The Parallax is the Difference between the Places in which the Sun or Moon appear, when ſeen from any Part of the Earth's Surface; and the Places in which they would appear, if ſeen at the ſame Time from the Earth's Centre; or the Parallax of the Sun or Moon is the Angle under which the Earth's Semi-diameter would appear, if ſeen from the Sun or Moon. Now as the Sun or Moon are elevated above their true Height by Refraction of the Atmoſphere, ſo they are depreſſed by their Parallax; and as they muſt appear higher when viewed from the Earth's Centre, than they would appear when viewed from the Surface thereof: To ſave the Mariner Trouble, the Difference is ſet down in theſe Tables, which applied to the obſerved Altitude of their Centres, gives the true Altitudes, as if ſeen from the Earth's Centre.

The Uſe of the following Table.

THE Corrections of the Moon's Altitude are ſet down only to each Degree of Altitude, and Minute of horizontal Parallax; but they may eaſily be found to intermediate Minutes of Altitude, and Seconds of horizontal Parallax, as follows:

1ſt. When the horizontal Parallax is given in Minutes without Seconds, and the Altitude in Degrees and Minutes; for Example:

The Moon's apparent Altitude was 24° 31′, when her horizontal Parallax was 59′. Required the Correction of her Altitude?

Find the Correction of Altitude for Horizontal Parallax 59′, and Altitude $\left\{\begin{matrix}24^\circ & 00\\ 25 & 00\end{matrix}\right\}$ which will be $\left\{\begin{matrix}51' & 47''\\ 51 & 27\end{matrix}\right\}$ and ſubtracting the Leſſer from the Greater, the Difference is 0′ 20″; then ſay, as 66 : 31′ : 0 : 0′ 20″ : 0′ 10″, which ſubtracted from 51′ 47″, becauſe the Correction for the greater Altitude is leaſt, gives 51′ 37″, the Correction required.

But had the Correction for the greater Altitude been greateſt, as is the Caſe at low Altitudes, then the Difference 0′ 10″, muſt have been added.

2dly When the Altitude is given in Degrees, and the horizontal Parallax in Minutes and Seconds; for Example, the Moon's apparent Altitude was 24°, when her horizontal Parallax was 59′ 21″. Required the Correction of her Altitude.

Find the Correction of Altitude for Altitude 34° and horizontal Parallax $\left\{\begin{matrix}59'\\ 60\end{matrix}\right\}$ which will be $\left\{\begin{matrix}51' & 47''\\ 52 & 42\end{matrix}\right\}$ and ſubtracting the Leſſer from the Greater, the Difference is 0′ 55″; then ſay, as 60″: 21″ :: 55″ : 19″, which added to 51′ 47″, gives 52′ 06″, the Correction required.

3dly. When the Altitude is given in Degrees and Minutes, and the horizontal Parallax in Minutes and Seconds; for Example, the Moon's apparent Altitude was 24° 31′, when her horizontal Parallax was 59′ 21″. Required the Correction of her Altitude?

By laſt Caſe, the Correction of Altitude for horizontal Parallax 59′ 21″, and Altitude $\left\{\begin{matrix}24^\circ\\ 25\end{matrix}\right\}$ is found to be $\left\{\begin{matrix}52' & 06''\\ 51 & 46\end{matrix}\right\}$ and ſubtracting the Leſſer from the Greater, the Difference is 0′ 20″; then ſay, as 60″ : 20″ :: 31″ : 10″, which ſubtracted from 52′ 06″, becauſe the Correction to the greateſt Altitude is leaſt, gives 51′ 56″, the Correction required.

TABLE II.

A **Table** of Corrections to be added to the Apparent Altitude of the Moon's Centre, for reducing it to the true Altitude, as if ſeen from the Earth's Centre.

	HORIZONTAL PARALLAX.																				
	53		54		55		56		57		58		59		60		61		62		
alt	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	alt
0	20	0	21	0	22	0	23	0	24	0	25	0	26	0	27	0	28	0	29	0	0
	28	31	29	31	30	31	31	31	32	31	33	31	34	31	34	31	36	31	37	31	1
1	34	23	35	23	36	23	37	23	38	23	39	23	40	23	41	23	42	23	43	23	2
2	38	20	39	20	40	20	41	20	42	20	43	20	44	20	45	19	46	19	47	19	3
43	41	1	42	1	43	1	44	1	45	1	46	1	47	1	48	1	49	1	50	1	4
5	42	55	43	54	44	54	45	54	46	54	47	54	48	54	49	53	50	53	51	53	5
6	44	15	45	14	40	4	47	14	48	13	49	13	50	13	51	12	52	12	53	12	6
7	45	16	46	16	47	16	48	16	49	15	50	15	51	14	52	14	53	14	54	13	7
8	46	0	46	59	47	59	48	58	49	58	50	57	51	57	52	56	53	55	54	55	8
9	46	33	47	32	48	31	49	31	50	30	51	29	52	28	53	28	54	27	55	26	9
10	46	57	47	57	48	56	49	55	50	54	51	53	52	52	53	51	54	50	55	49	10
11	47	15	48	14	49	13	50	12	51	11	52	10	53	9	54	8	55	7	56	6	11
12	47	27	48	26	49	25	50	24	51	22	52	21	53	20	54	18	55	17	56	16	12
13	47	35	48	34	49	32	50	31	51	29	52	28	53	26	54	25	55	23	56	22	13
14	47	41	48	40	49	38	50	36	51	34	52	33	53	31	54	29	55	27	56	25	14
15	47	42	48	40	49	38	50	36	51	34	52	32	53	30	54	28	55	26	56	24	15
16	47	40	48	38	49	35	50	33	51	31	52	28	53	26	54	24	55	21	56	19	16
17	47	37	48	34	49	32	50	29	51	27	52	24	53	21	54	19	55	16	56	13	17
18	47	31	48	28	49	25	50	22	51	19	52	16	53	13	54	10	55	7	56	4	18
19	47	23	48	20	49	16	50	13	51	10	52	6	53	3	54	0	54	57	55	53	19
20	47	13	48	10	49	6	50	2	50	59	51	55	52	52	53	48	54	44	55	41	20
21	47	2	47	58	48	58	49	50	50	46	51	42	52	38	53	38	54	30	55	20	21
22	46	48	47	44	48	40	49	35	50	31	51	27	52	22	53	18	54	13	55	9	22
23	46	33	47	29	48	24	49	19	50	14	51	10	52	5	53	0	53	55	54	51	23
24	46	18	47	13	48	8	49	2	49	57	50	52	51	47	52	42	53	37	54	31	24
25	46	0	46	55	47	49	48	44	49	38	50	32	51	27	52	21	53	15	54	10	25
26	45	42	46	36	47	30	48	24	49	18	50	12	51	6	52	0	52	54	53	48	26
27	45	22	46	16	47	9	48	3	48	56	49	50	50	43	51	37	52	30	53	24	27
28	45	1	45	54	46	47	47	40	48	33	49	26	50	19	51	12	52	5	52	58	28
29	44	39	45	32	6	24	47	17	48	9	49	2	49	54	50	47	51	39	52	32	29
30	44	16	45	8	46	0	46	52	47	44	48	36	49	28	50	20	51	11	52	3	30
31	43	51	44	43	45	34	46	25	47	17	48	8	49	0	49	51	50	43	51	34	31
32	43	26	44	17	45	8	45	58	46	49	47	40	48	31	49	22	50	13	51	4	32
33	42	59	43	50	44	40	45	30	46	21	47	11	48	1	48	52	49	42	50	32	33
34	42	32	43	22	44	12	45	2	45	51	46	41	47	31	48	21	49	10	50	0	34
35	42	4	42	53	43	42	44	31	45	21	46	10	46	50	47	48	48	37	49	26	35
36	41	35	42	23	43	12	44	0	44	49	45	37	46	26	47	14	48	3	48	52	36
37	41	4	41	53	42	40	43	28	44	16	45	4	45	51	46	39	47	27	48	15	37
38	40	33	41	20	42	7	42	55	43	42	44	29	45	17	46	4	46	51	47	39	38
39	40	1	40	48	41	35	42	21	43	8	43	54	44	41	45	28	46	14	47	1	39
40	39	28	40	14	41	0	41	46	42	32	43	18	44	4	44	50	45	36	46	22	40
41	38	55	39	40	40	26	41	11	41	56	42	41	43	27	44	12	44	58	45	43	41
42	38	20	39	5	39	49	40	34	41	19	42	3	42	48	43	32	44	17	45	2	42
43	37	45	38	29	36	12	39	56	40	40	41	24	42	8	42	53	43	36	44	20	43
44	37	8	37	52	38	35	39	18	40	1	40	44	41	27	42	11	43	54	43	37	44
45	36	32	37	14	37	56	38	29	39	39	40	4	40	46	41	20	42	11	42	52	45

A TABLE of Corrections to be added to the Apparent Altitude of the Moon's Centre, for reducing it to the true Altitude, as if ſeen from the Earth's Centre.

	HORIZONTAL PARALLAX.																				
	53		54		55		56		57		58		59		60		61		62		
alt	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	Corr. ′	″	alt
45	36	32	37	14	37	56	38	39	39	21	40	4	40	46	41	29	42	11	42	53	45
46	35	54	36	36	37	17	37	59	38	41	39	22	40	4	40	46	41	27	42	9	46
47	35	16	35	57	36	38	37	19	37	59	38	40	39	21	40	2	40	43	41	24	47
48	34	37	35	17	35	57	36	37	37	17	37	58	38	38	39	18	39	58	40	38	48
49	33	57	34	37	35	16	35	55	36	35	37	14	37	55	38	33	39	12	39	52	49
50	33	16	33	55	34	34	35	12	35	51	36	20	37	8	37	46	38	25	39	3	50
51	32	35	33	13	33	51	34	29	35	0	35	44	36	24	37	0	37	57	38	15	51
52	31	54	32	31	33	8	33	45	34	22	34	58	35	35	36	12	36	49	37	26	52
53	31	11	31	47	32	23	32	59	33	36	34	12	34	48	35	24	36	0	36	36	53
54	30	28	31	3	31	39	32	14	32	49	33	24	34	0	34	35	35	10	35	46	54
55	29	44	30	19	30	53	31	28	32	2	32	36	33	11	33	45	34	20	34	54	55
56	29	0	29	34	30	7	30	41	31	14	31	40	32	22	32	55	33	29	34	2	56
57	28	15	28	48	29	20	29	53	30	26	30	58	31	31	32	4	32	36	33	9	57
58	27	30	28	2	28	34	29	6	29	37	30	9	30	41	31	13	31	44	32	16	58
59	26	44	27	15	27	46	28	17	28	47	29	16	29	49	30	20	30	51	31	22	59
60	25	57	26	27	26	57	27	27	27	57	28	27	28	57	29	27	29	57	30	28	60
61	25	10	25	39	26	8	26	37	27	6	27	35	28	4	18	34	29	3	29	30	61
62	24	23	24	51	25	19	25	47	26	16	26	44	27	12	27	40	28	8	28	36	62
63	23	35	24	2	24	29	24	56	25	23	25	51	26	18	26	45	27	13	27	40	63
64	22	46	23	12	23	39	24	5	24	31	24	58	25	24	25	50	26	17	26	43	64
65	21	58	22	23	22	49	23	14	23	39	24	5	24	30	24	55	25	21	25	46	65
66	21	9	21	33	21	57	22	22	22	46	23	10	23	35	23	59	24	24	24	48	66
6	20	19	20	42	21	5	21	29	21	52	22	16	22	39	23	3	23	26	23	50	67
6	19	28	19	51	20	13	20	36	20	58	21	21	21	43	22	6	22	28	22	51	68
6	18	38	18	59	19	21	19	42	20	4	20	25	20	47	21	8	21	30	21	51	69
7	17	47	18	7	18	28	18	48	19	9	19	29	19	50	20	11	20	31	20	52	70
71	16	50	17	16	17	35	17	55	18	14	18	34	18	55	19	13	19	33	19	52	71
72	16	5	16	23	16	42	17	0	17	19	17	37	17	56	18	14	18	33	18	52	72
73	15	13	15	30	15	48	16	5	16	23	16	40	16	58	17	16	17	33	17	51	73
74	14	21	14	37	14	54	15	10	15	27	15	43	16	0	16	16	16	33	16	49	74
75	13	28	13	44	13	50	14	15	14	30	14	46	15	1	15	17	15	32	15	48	75
76	12	35	12	50	13	4	13	19	13	33	13	48	14	2	14	17	14	31	14	40	76
77	11	42	11	56	12	9	12	23	12	36	12	50	13	3	13	17	13	30	13	44	77
78	10	49	11	2	11	14	11	27	11	39	11	52	12	4	12	16	12	29	12	41	78
79	9	56	10	7	10	19	10	30	10	42	10	53	11	4	11	16	11	27	11	39	79
80	9	2	9	13	9	23	9	32	9	44	9	54	10	5	10	15	10	26	10	36	80
81	8	8	8	18	8	27	8	37	8	46	8	55	9	5	9	14	9	24	9	33	81
82	7	15	7	23	7	31	7	40	7	48	7	56	8	5	8	13	8	21	8	30	82
83	6	21	6	28	6	35	6	42	6	50	6	57	7	4	7	12	7	19	7	26	83
84	5	26	5	33	5	39	5	45	5	51	5	58	6	4	6	10	6	17	6	23	84
85	4	32	4	37	4	42	4	48	4	53	4	58	5	4	5	9	5	14	5	19	85
86	3	38	3	42	3	46	3	50	3	59	3	59	4	3	4	7	4	11	4	15	86
87	2	43	2	47	2	50	2	53	2	59	2	59	3	2	3	5	3	9	3	12	87
88	1	49	1	51	1	53	1	55	1	57	1	59	2	2	2	4	2	6	2	8	88
89	0	55	0	56	0	56	0	58	0	59	1	0	1	1	1	2	1	3	1	4	89
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90

TABLE III.

For reducing the Degrees, Minutes, and Seconds of the Longitude, *or right* Aſcenſion, *into Hours, Minutes, and Seconds of* Time, *and the contrary.*

Deg.	H.	M.	Deg.	H.	M.	Degrees.	Hours.	
Min.	M.	S.	Min.	M.	S.			
Sec.	S.	T.	Sec.	S.	T.			
1	0	4	31	2	4	70	4	40
2	0	8	32	2	8	80	5	20
3	0	12	33	2	12	90	6	0
4	0	16	34	2	16	100	6	40
5	0	20	35	2	20	110	7	20
6	0	24	36	2	24	120	8	0
7	0	28	37	2	28	130	8	40
8	0	32	38	2	32	140	9	20
9	0	36	39	2	36	150	10	0
10	0	40	40	2	40	160	10	40
11	0	44	41	2	44	170	11	20
12	0	48	42	2	48	180	12	0
13	0	52	43	2	52	190	12	40
14	0	56	44	2	56	200	13	20
15	1	0	45	3	0	210	14	0
16	1	4	46	3	4	220	14	40
17	1	8	47	3	8	230	15	20
18	1	12	48	3	12	240	16	0
19	1	16	49	3	16	250	16	40
20	1	20	50	3	20	260	17	20
21	1	24	51	3	24	270	18	0
22	1	28	52	3	28	280	18	40
23	1	32	53	3	32	290	19	20
24	1	36	54	3	36	300	20	0
25	1	40	55	3	40	310	20	40
26	1	44	56	3	44	320	21	20
27	1	48	57	3	48	330	22	0
28	1	52	58	3	52	340	22	40
29	1	56	59	3	56	350	23	20
30	2	0	60	4	0	360	24	0

The Uſe of this Table is eaſy by the Example following: Let it be required to find what Time is required for the Motion of 108° 4′ 15″ under the Meridian?

		H.	′	″
Then againſt 100°	is	6H.	40′	0″
8°	—	0	32	0
4′	—	0	0	16
45″	—	0	0	3
The Anſwer is		7	12	19

A TABLE of the SUN'S RIGHT ASCENSION.

Days.	Jan.	Feb.	Mar.	April	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Days.
	South	South	South	North	North	North	North	North	North	South	South	South	
	H. M.	H. M.	H. M.	H. M.	H. M	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	
1	18 48	21 0	22 49	0 43	2 34	4 36	6 41	8 46	10 42	12 30	14 26	16 30	1
2	18 52	21 4	22 53	0 46	2 38	4 41	6 45	8 49	10 45	12 33	14 30	16 34	2
3	18 57	21 8	22 57	0 50	2 41	4 45	6 49	8 53	10 49	12 37	14 34	16 39	3
4	19 1	21 12	23 1	0 53	2 45	4 49	6 53	8 57	10 52	12 41	14 38	16 43	4
5	19 6	21 16	23 4	0 57	2 49	4 53	6 57	9 1	10 56	12 44	14 42	16 47	5
6	19 10	21 20	23 8	1 1	2 53	4 56	7 1	9 5	11 0	12 48	14 46	16 52	6
7	19 14	21 24	23 11	1 4	2 57	5 1	7 5	9 9	11 3	12 52	14 50	16 56	7
8	19 19	21 28	23 15	1 8	3 1	5 5	7 10	9 12	11 7	12 55	14 54	17 0	8
9	19 23	21 32	23 19	1 12	3 5	5 9	7 14	9 16	11 11	12 59	14 58	17 5	9
10	19 27	21 36	23 22	1 15	3 8	5 13	7 18	9 20	11 14	13 3	15 2	17 9	10
11	19 32	21 40	23 26	1 19	3 12	5 18	7 22	9 24	11 18	13 6	15 6	17 14	11
12	19 36	21 44	23 30	1 23	3 16	5 22	7 26	9 28	11 21	13 10	15 10	17 18	12
13	19 40	21 48	23 33	1 26	3 20	5 26	7 30	9 31	11 25	13 14	15 14	17 23	13
14	19 45	21 52	23 37	1 30	3 24	5 30	7 34	9 35	11 28	13 17	15 18	17 27	14
15	19 49	22 56	23 41	1 34	3 28	5 34	7 38	9 39	11 32	13 21	15 22	17 31	15
16	19 53	22 0	23 44	1 37	3 32	5 38	7 42	9 43	11 36	13 25	15 26	17 36	16
17	19 58	22 4	23 48	1 41	3 36	5 43	7 46	9 46	11 39	13 29	15 31	17 40	17
18	20 2	22 7	23 52	1 45	3 40	5 47	7 50	9 50	11 43	13 32	15 35	17 45	18
19	20 6	22 11	23 55	1 49	3 44	5 51	7 54	9 54	11 46	13 36	15 39	17 49	19
20	20 10	22 15	23 59	1 52	3 48	5 55	7 58	9 58	11 50	13 40	15 43	17 54	20
21	20 14	22 19	0 3	1 56	3 52	5 59	8 2	10 1	11 54	13 44	15 47	17 58	21
22	20 19	22 23	0 6	2 0	3 56	6 3	8 6	10 5	11 57	13 47	15 52	18 2	22
23	20 23	22 26	0 10	2 3	4 0	6 7	8 10	10 9	12 1	13 51	15 56	18 7	23
24	20 27	22 30	0 13	2 7	4 4	6 12	8 14	10 12	12 4	13 55	16 0	18 11	24
25	20 31	22 34	0 17	2 11	4 8	6 16	8 18	10 16	12 8	13 59	16 4	18 16	25
26	20 35	22 38	0 21	2 15	4 12	6 20	8 22	10 20	12 12	14 3	16 9	18 20	26
27	20 40	22 42	0 24	2 19	4 16	6 24	8 26	10 23	12 15	14 7	16 13	18 25	27
28	20 44	22 45	0 28	2 22	4 20	6 28	8 30	10 27	12 19	14 10	16 17	18 29	28
29	20 48		0 32	2 26	4 24	6 32	8 34	10 31	12 22	14 14	16 21	18 34	29
30	20 52		0 35	2 30	4 28	6 37	8 38	10 34	12 26	14 18	16 26	18 38	30
31	20 56		0 39		4 32		8 42	10 38		14 22		18 42	31

This Table is ſufficiently exact for finding, when any Star comes to the Meridian, in order to obtain the Latitude; but in all Calculations for determining the Longitude by Celeſtial Obſervations, the Sun's Right Aſcenſion and Declination muſt be taken out of the Nautical Almanac, as they are there calculated to a greater Degree of Accuracy.

A TABLE of the Right Aſcenſion and Declination of ſome of the principal fixed Stars, adapted to the beginning of the Year 1779, with their Annual Variation.

Names of the Stars.	Right Aſcen. in Time				Ann. Vari.		Declination.				Ann. Vari.		
	H.	M.	S.	T.	S.	T.	°	′	″		S.	T	
Arietis - - - -	1	54	45	2	3	337	22	24	34	2N	17	64	+
Aldebaran, South Eye of the Bull -	4	23	15	5	3	427	16	2	57	9N	8	32	+
Pollux, Southern Twin - -	7	30	17	4	3	751	28	32	36	5N	7	72	—
Regulus, the Lion's Heart - -	9	35	17	8	3	24	13	2	23	6N	17	17	—
Spica Virginis - - -	13	13	34	8	3	151	10	0	4	6S.	18	97	+
Antares, the Scorpion's Heart -	16	15	53	6	3	661	25	55	22	9S.	8	89	+
Altair in Aquila, the Eagle -	19	39	56	6	3	902	8	17	44	6N	8	40	+
Capricorn - - - - -	20	5	6	6	3	346	13	12	55	4S.	10	40	—
Fomalhaut, in the Mouth of Southern Fiſh	22	44	3	2	3	378	30	47	13	6S.	18	97	—
Pegaſi Markab - - -	22	53	46	1	3	983	14	1	10	8N	19	20	+
Pegaſi Algenib, in the Wing -	0	1	52	8	3	08	13	57	7	8N	20	4	+
Ceti - - -	2	50	45	0	3	128	3	12	41	7N	14	80	+
Capella, in Left Shoulder of Auriga	5	0	21	1	4	402	45	44	42	3N	5	28	+
Rigel, in the Foot of Orion -	5	2	46	2	2	887	8	28	16	1S.	4	94	—
Taurus - - -	5	12	20	4	3	786	28	24	8	5N	4	24	+
Orion, in the Eaſt Shoulder -	5	43	12	8	3	250	7	20	46	6N	1	56	+
Sirius, in Great Dog's Mouth -	6	35	25	5	2	690	16	25	5	3S.	3	10	+
Caſtor, in Head Southern Twin -	7	18	55	6	3	876	32	21	14	8N	6	80	—
Procyon, in the Little Dog -	7	26	27	7	3	205	5	47	3	4N	7	42	—
Arcturus in Bootes - -	14	4	29	4	2	821	20	21	5	9N	17	16	—
Sagitarius - - -	18	7	54	9	3	930	34	27	55	9S.	0	72	—
Schedar in the Breaſt of Caſſiopea -	0	28	3	2	3	300	55	19	18	N	20		+
Pole Star in the Tail of the Little Bear	0	47	35	0	1	500	88	7	30	N	19		+
Achernar, in the River Eridanus -	1	28	20	9	2	26	56	21	56	S.	18		
Almaack, in the Foot of Andromeda -	1	50	24	4	3	61	41	15	38	N	18		+
Algol in the Head of Meduſa -	2	54	11	3	3	84	40	5	24	N	15		+
Pleiades or Seven Stars in the Neck of the Bull	3	34	21	2	3	54	23	24	24	N	12		+
Canobus, in Poop of Ship Argo -	6	19	2	3	1	34	52	34	55	S.	2		+
Cor Hydrae, or Alphard - -	9	16	43	8	1	96	7	42	30	S.	15		+
Dubbe, the North Pointer in the Great Bear	10	47	58	4	3	89	62	56	22	N	19		—
South Star of Croſiers, Foot of the Croſs.	12	14	29	8	3	22	61	52	27	S.	20		+
The Weſt Foot of Centaur - - -	14	24	57	6	4	41	59	54	59	S.	16		+
The Head of Andromeda - -	23	57	2	4	3	6	27	52	13	N	20		+
Lyra, the Bright Star in the Harp -	18	29	27	0	2	0	38	35	13	N	2		+
Eridani - - -	1	29	1	9	2	26	58	32	22	S.	18		+
Coronae - - -	15	24	41	0	2	0	27	28	17	N	12		—
Mirach, in Andromeda's Girdle -	0	57	23	1	3	29	34	26	37	N	19		+
Bright Star in Oars of Ship Argo -	9	10	43	0	0	75	68	48	53	S.	15		+
Southern Scale of Libra - -	14	38	50	2	3	30	15	7	39	S.	16		+
Northern Scale of Libra - -	15	5	17	2	3	30	8	33	59	S.	14		+
The Bright Star in Perſeus - -	3	8	38	7	4	19	49	3	26	N	14		+

The firſt Ten Stars are uſed in the Nautical Almanac for determining the Longitude deduced from Doctor Bradley's Obſervations. All the Stars Right Aſcenſions are here reduced into Time, it being omitted in the Ephemeris for 1767.

The Right Aſcenſions and Declinations above are ſufficiently exact for finding when any Star comes on the Meridian to find the Latitude by; but when uſed in determining the Longitude, the Annual Variation muſt be multiplied by the Number of Years, ſince 1779, and then added to, or ſubtracted from the Right Aſcenſion and Declination, as marked in the Tables; the Sum, or Difference, will give the Right Aſcenſion and Declination for that Year.

Note. — Signifies Subtraction + Addition.

It is obvious, that by the Sun's Annual Motion, he is perpetually changing his Declination and Right Aſcenſion, which is ſet down in the preceding Table for the Noon of every Day at London; and may be reduced to any other Time or Meridian, as has been already ſhewn in finding the Longitude.

By the Preceſſion of the Equinoxes, the fixed Stars are continually altering their Longitudes, Right Aſcenſions, and Declinations, the Alteration in Longitude is about 50 Seconds every Year; the Alteration in Right Aſcenſion and Declination of ſome of the principal fixed Stars are ſet down in the preceding Table for 1779; and their Annual Variation, which being applied to the Right Aſcenſion and Declination in the Table, by Addition or Subtraction, gives the Right Aſcenſion and Declination for any ſucceeding Years.

The Right Aſcenſion of the Sun, Moon, or Stars, is the Number of Degrees of the Equinoctial that comes to the Meridian with them, counted from the firſt Point of Aries.

The Uſe of the Tables of the Right Aſcenſion of the Sun and Stars is to find the Time when any Star culminates, or is upon the Meridian on a given Day.

RULE.

Look for the Right Aſcenſion of the Sun and Star in the preceding Table, and ſubtract the Sun's Right Aſcenſion from the Star's; but if the Sun's Right Aſcenſion be greateſt, add 24 Hours to the Star's Right Aſcenſion, and then ſubtract the Sun's from it, the Remainder will be the Time of the Star's coming to the Meridian.

When the Sun's Right Aſcenſion is leaſt, the Star comes to the Meridian in the Afternoon, but before Noon when the Sun's is greateſt

EXAMPLE I.

At what Time will the Star Arcturus be on the Meridian of London, Dec. 1?

	H.	M.
Arcturus's Right Aſcenſion -	14	4
	24	0
	38	4
Su[illegible]Aſcenſion - -	16	30
After Midnight - -	21	34
	12	0
Morning - - -	9	34

That is, the Star Arcturus will be upon the Meridian of London 34 Minutes after Nine o'Clock in the Morning. The Seconds are here rejected.

EXAMPLE II.

At what Time will the Star Virgin's Spike be on the Meridian of London, September 1?

	H.	M.
Spica's Virginis's Right Aſcenſion	13	13
Sun's Right Aſcenſion - -	10	42
The Star culminates Afternoon	2	31

So the Star Virgin's Spike comes to the Meridian at London 31 Minutes after Two in the Afternoon.

To find what Star will come upon the Meridian at any given Time.

RULE.

Add the Time from Noon to the Right Aſcenſion of the Sun, the Sum will be the Right Aſcenſion of the Star required to be known; with which enter the Table of the Star's Right Aſcenſion, and find what Star's Right Aſcenſion agrees with, or comes the neareſt to it, and that is the Star required.

EXAMPLE I.

I would know what Star would be on the Meridian of London about Ten at Night, January 25?

	H.	M.
Sun's Right Aſcen. Jan. 25, at Noon	20	31
And for 10 Hours more —	0	2
Given Time 10 Hours P. M.	10	0
	30	33
Sub.	24	0
Nearly anſwers to Sirius -	6	33

EXAMPLE II.

What Star will be upon the Meridian of London 30 Minutes paſt Four in the Morning, May 10?

	H.	M.
Sun's Right Aſcen. May 9, at Noon,	3	5
And for 16 Hours more - -	0	3
Given Time 16h 30m. P. M.	16	30
Right Aſcenſion of Mid Heaven	19	38

Anſwers nearly to Aquila

A TABLE of the SUN's DECLINATION for the YEARS 1773, 1777, 1781, 1785, 1789, 1793, 1797.

First after LEAP-YEAR.

Days	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
	D. M.	D. M.	D. M.	D. M	D. M.	D. M.	D. M.	D. M.	D. M.	D. M	D. M.	D. M.
1	22 58	16 54	7 19	4 48	15 16	22 9	23 6	17 54	8 5	3 26	14 40	21 56
2	22 53	16 37	6 56	5 11	15 34	22 17	23 2	17 39	7 43	3 49	14 59	22 5
3	22 46	16 19	6 33	5 34	15 52	22 24	22 57	17 23	7 21	4 12	15 17	22 14
4	22 40	16 1	6 10	5 57	16 9	22 31	22 5	17 7	6 59	4 35	15 36	22 22
5	22 33	15 43	5 47	6 19	16 26	22 38	22 46	16 51	6 37	4 58	15 54	22 29
6	22 26	15 24	5 24	6 42	16 43	22 44	22 40	16 34	6 14	5 22	16 12	22 36
7	22 18	15 5	5 0	7 5	17 0	22 50	22 33	16 18	5 52	5 45	16 30	22 43
8	22 10	14 46	4 37	7 27	17 16	22 55	22 27	16 1	5 29	6 8	16 47	22 49
9	22 01	14 27	4 14	7 49	17 32	23 0	22 19	15 43	5 6	6 30	7 4	22 55
10	21 52	14 7	3 50	8 11	17 47	23 5	22 12	15 26	4 44	6 53	17 21	23 0
11	21 42	13 47	3 27	8 33	18 3	23 9	22 4	15 8	4 21	7 16	17 38	23 5
12	21 33	13 27	3 3	8 55	18 18	23 13	21 56	14 50	3 58	7 38	17 54	23 10
13	21 22	13 7	2 39	9 17	18 33	23 16	21 47	14 31	3 35	8 1	18 10	23 14
14	21 11	12 47	2 16	9 38	18 47	23 19	21 38	14 13	3 12	8 23	18 26	23 17
15	21 0	12 26	1 52	10 0	19 1	23 22	21 28	13 54	2 48	8 46	18 41	23 20
16	20 49	12 5	1 28	10 21	19 15	23 24	21 18	13 35	2 25	9 8	18 56	23 23
17	20 37	11 44	1 5	10 42	19 29	23 25	21 8	13 16	2 2	9 30	19 11	23 25
18	20 24	11 23	0 41	11 3	19 42	23 27	20 58	12 56	1 39	9 52	19 25	23 26
19	20 12	11 2	0 17	11 24	19 55	23 28	20 47	12 37	1 15	10 13	19 39	23 27
20	19 59	10 40	N. 6	11 44	20 7	23 28	20 35	12 17	0 52	10 35	19 52	23 28
21	19 45	10 18	0 30	12 5	20 19	23 28	20 24	11 57	0 29	10 56	20 6	23 28
22	19 31	9 56	0 54	12 25	20 31	23 28	20 12	11 37	0 5	11 18	20 18	23 28
23	19 17	9 34	1 17	12 45	20 42	23 27	20 0	11 16	S. 18	11 39	20 31	23 27
24	19 3	9 12	1 41	13 4	20 54	23 26	19 47	10 56	0 42	12 0	20 43	23 26
25	18 48	8 50	2 5	13 24	21 4	23 24	19 34	10 35	1 5	12 20	20 55	23 24
26	18 32	8 27	2 28	13 43	21 15	23 22	19 21	10 14	1 29	12 41	21 6	23 22
27	18 17	8 5	2 52	14 2	21 25	23 20	19 7	9 53	1 52	13 1	21 17	23 19
28	18 1	7 42	3 15	14 21	21 34	23 17	18 53	9 32	2 15	13 21	21 27	23 16
29	17 45		3 38	14 40	21 44	23 14	18 39	9 10	2 39	13 41	21 37	23 13
30	17 28		4 2	14 58	21 53	23 10	18 24	8 49	3 2	14 1	21 47	23 9
31	17 11		4 25		22 1		18 10	8 27		14 20		23 4

A TABLE of the SUN'S DECLINATION for the Years 1774, 1778, 1782, 1786, 1790, 1794, 1798.

Each being the Second after LEAP-YEAR.

Days	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.
1	22 59	16 58	7 25	4 42	15 12	22 7	23 7	17 58	8 10	3 20	14 35	21 54
2	22 54	16 41	7 2	5 5	15 30	22 15	23 3	17 43	7 49	3 43	14 54	22 3
3	22 48	16 23	6 39	5 28	15 47	22 23	22 58	17 27	7 26	4 7	15 13	22 12
4	22 42	16 5	6 16	5 51	16 5	22 30	22 53	17 11	7 4	4 30	15 32	22 20
5	22 35	15 47	5 53	6 14	16 22	22 36	22 47	16 55	6 42	4 53	15 50	22 27
6	22 27	15 29	5 29	6 37	16 39	22 43	22 41	16 38	6 20	5 16	16 8	22 35
7	22 20	15 10	5 6	6 59	16 56	22 48	22 35	16 23	5 57	5 39	16 26	22 41
8	22 12	14 51	4 43	7 21	17 12	22 54	22 28	16 5	5 34	6 2	16 43	22 48
9	22 3	14 32	4 19	7 44	17 28	22 59	22 21	15 47	5 12	6 25	17 0	22 54
10	21 54	14 12	3 56	8 6	17 44	23 4	22 14	15 30	4 49	6 48	17 17	22 59
11	21 45	13 52	3 32	8 28	17 59	23 8	22 6	15 12	4 26	7 11	17 34	23 4
12	21 35	13 32	3 9	8 50	18 14	23 12	21 58	14 54	4 3	7 33	17 50	23 8
13	21 25	13 12	2 45	9 12	10 29	23 15	21 49	14 36	3 40	7 50	18 6	23 12
14	21 14	12 52	2 21	9 33	18 44	23 18	21 40	14 17	3 17	8 18	18 22	23 16
15	21 3	12 31	1 58	9 55	18 58	23 21	21 31	13 58	2 54	8 40	18 37	23 20
16	20 52	12 10	1 34	10 16	19 12	23 23	21 21	13 40	2 31	9 3	18 52	23 22
17	20 40	11 49	1 10	10 37	19 25	23 25	21 11	13 20	2 7	9 24	19 7	23 24
18	20 28	11 28	0 47	10 58	19 39	23 26	21 0	13 1	1 44	9 47	19 22	23 26
19	20 15	11 7	0 23	11 19	19 52	23 27	20 49	12 41	1 21	10 8	19 36	23 27
20	20 2	10 45	N. 1	11 39	20 4	23 28	20 38	12 22	0 57	10 30	19 49	23 28
21	19 48	10 23	0 24	12 0	20 16	23 28	20 27	12 2	0 34	10 51	20 2	23 28
22	19 35	10 2	0 48	12 20	20 28	23 28	20 15	11 41	0 11	11 13	20 15	23 28
23	19 21	9 40	1 12	12 40	20 40	23 27	20 3	11 21	S. 13	11 34	20 28	23 27
24	19 6	9 17	1 35	13 0	20 51	23 26	19 50	11 1	0 36	11 55	20 4	23 26
25	18 51	8 55	1 59	13 19	21 2	23 25	19 37	10 40	1 0	12 15	20 52	23 25
26	18 36	8 33	2 22	13 39	21 12	23 23	19 24	10 19	1 23	12 36	21 3	23 23
27	18 21	8 10	2 46	13 58	21 22	23 21	19 10	9 58	1 46	12 56	21 14	23 20
28	18 5	7 48	3 9	14 17	21 32	23 18	18 57	9 37	2 10	13 17	21 25	23 17
29	17 49		3 33	14 35	21 41	23 15	18 42	9 15	2 33	13 36	21 35	23 14
30	17 32		3 56	14 54	21 50	23 11	18 28	8 54	2 57	13 56	21 45	23 10
31	17 15		4 19		21 59		18 13	8 32		14 16		23 5

A TABLE of the SUN'S DECLINATION for the YEARS 1775, 1779, 1783, 1787, 1791, 1795, 1799.

Third after LEAP-YEAR.

Days	Jan.	Feb.	Marc.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.
1	23 0	17 2	7 30	4 36	15 8	22 5	23 8	18 2	8 16	3 14	14 30	21 52
2	22 55	16 45	7 7	5 0	15 26	22 13	23 4	17 46	7 54	3 38	14 50	22 1
3	22 49	16 28	6 44	5 23	15 43	22 21	22 59	17 31	7 32	4 1	15 8	22 10
4	22 43	16 10	6 21	5 46	16 1	22 28	22 54	17 15	7 10	4 24	15 27	22 18
5	22 36	15 51	5 58	6 8	16 18	22 35	22 49	16 59	6 47	4 48	15 45	22 26
6	22 29	15 33	5 35	6 31	16 35	22 41	22 43	16 42	6 25	5 11	16 4	22 33
7	22 22	15 14	5 12	6 54	16 52	22 47	22 37	16 26	6 2	5 34	16 21	22 40
8	22 14	15 55	4 48	7 16	17 8	22 53	22 30	16 9	5 40	5 57	16 39	22 46
9	22 5	14 36	4 25	7 39	17 24	22 58	22 23	15 51	5 17	6 20	16 56	22 52
10	21 56	14 17	4 1	8 1	17 40	23 3	22 16	15 34	4 54	6 42	17 13	22 58
11	21 48	13 57	3 38	8 23	17 55	23 7	22 8	15 16	4 32	7 5	17 30	23 3
12	21 37	13 37	3 14	8 43	18 11	23 11	21 0	14 58	4 9	7 28	17 46	23 7
13	21 27	13 17	2 51	9 7	18 26	23 15	21 51	14 40	3 46	7 50	18 2	23 12
14	21 17	12 57	2 27	9 28	18 40	23 18	21 42	14 22	3 23	8 13	18 18	23 15
15	21 6	12 36	2 3	9 50	18 54	23 20	21 33	14 3	3 0	8 35	18 34	23 19
16	20 54	12 15	1 40	10 11	19 8	23 23	21 23	13 44	2 36	8 57	18 49	23 21
17	20 43	11 54	1 16	10 32	19 22	23 25	21 13	13 25	2 13	9 19	19 4	23 24
18	20 31	11 33	0 52	10 53	19 35	23 26	21 3	13 6	1 50	9 41	19 18	23 25
19	20 18	11 12	0 29	11 14	19 48	23 27	20 52	12 46	1 27	10 3	19 32	23 27
20	20 5	10 50	0 5	11 34	20 1	23 28	20 41	12 26	1 3	10 25	19 46	23 28
21	19 52	10 29	N. 19	11 55	20 13	23 28	20 29	12 7	0 40	10 46	19 59	23 28
22	19 38	10 7	0 42	12 15	20 24	23 28	20 18	11 45	0 16	11 7	20 12	23 28
23	19 24	9 45	1 6	12 35	20 37	23 27	20 6	11 26	S. 7	11 29	20 25	23 28
24	19 10	9 23	1 30	12 55	20 48	23 27	19 53	11 6	0 31	11 50	20 37	23 27
25	18 55	9 1	1 53	13 15	20 59	23 25	19 40	10 45	0 54	12 10	20 49	23 25
26	18 40	8 38	2 17	13 34	21 10	23 23	19 27	10 24	1 17	12 31	21 1	23 23
27	18 24	8 16	2 40	13 53	21 20	23 21	19 14	10 3	1 41	12 51	21 12	23 21
28	18 9	7 53	3 4	14 12	21 30	23 18	19 0	9 42	2 4	13 12	21 22	23 18
29	17 53		3 27	14 31	21 39	23 15	18 46	9 20	2 28	13 32	21 33	23 14
30	17 36		3 50	14 49	21 48	23 12	18 31	8 59	2 51	13 52	21 43	23 11
31	17 19		4 14		21 57		18 17	8 37		14 11		23 6

A TABLE of the SUN's DECLINATION for the Years 1776, 1780, 1784, 1788, 1792, 1796, 1800.

Each being LEAP-YEAR.

Days	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	South	South	South	North	North	North	North	North	North	South	South	South
	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.	D. M.
1	23 2	17 7	7 14	4 53	15 21	22 11	23 5	17 51	8 0	3 31	14 44	21 59
2	22 57	16 50	6 52	5 16	15 38	22 19	23 1	17 35	7 38	3 55	15 3	22 7
3	22 51	16 32	6 28	5 39	15 56	22 26	22 56	17 19	7 16	4 18	15 22	22 16
4	22 45	16 15	6 5	6 2	16 13	22 33	22 50	17 3	6 54	4 41	15 40	22 24
5	22 38	15 57	5 42	6 25	16 30	22 39	22 45	16 47	6 31	5 4	15 59	22 31
6	22 31	15 38	5 18	6 47	16 47	22 45	22 38	16 30	6 9	5 27	16 17	22 38
7	22 24	15 20	4 55	7 10	17 3	22 51	22 32	16 14	5 46	5 50	16 34	22 45
8	22 16	15 1	4 31	7 32	17 20	22 56	22 25	15 56	5 24	6 13	16 52	22 51
9	22 8	14 41	4 8	7 55	17 36	23 1	22 18	15 39	5 1	6 36	17 9	22 56
10	21 59	14 22	3 44	8 17	17 51	23 6	22 10	15 21	4 38	6 59	17 25	23 1
11	21 50	14 2	3 21	8 39	18 6	23 10	22 2	15 3	4 15	7 21	17 42	23 6
12	21 40	13 43	2 57	9 0	18 21	23 14	21 54	14 45	3 52	7 44	17 58	23 11
13	21 30	13 23	2 34	9 22	18 36	23 17	21 45	14 27	3 29	8 6	18 14	23 14
14	21 20	13 2	2 10	9 44	18 51	23 20	21 35	14 8	3 6	8 29	18 29	23 18
15	21 9	12 42	1 46	10 5	19 5	23 22	21 26	13 49	2 43	8 51	18 45	23 21
16	20 58	12 21	1 25	10 26	19 18	23 24	21 16	13 30	2 20	9 13	19 0	23 23
17	20 46	12 0	0 59	10 47	19 32	23 26	21 6	13 11	1 56	9 35	19 14	23 25
18	20 34	11 39	0 35	11 8	19 46	23 27	20 55	12 52	1 33	9 57	19 28	23 27
19	20 21	11 18	0 12	11 29	19 58	23 28	20 44	12 32	1 10	10 19	19 42	23 28
20	20 9	10 56	N. 12	11 49	20 10	23 28	20 33	12 12	0 46	10 40	19 56	23 28
21	19 55	10 35	0 34	12 9	20 22	23 28	20 21	11 52	0 23	11 2	20 9	23 28
22	19 42	10 13	0 59	12 30	20 34	23 28	20 9	11 32	S. 0	11 23	20 21	23 28
23	19 28	9 51	1 23	12 49	20 45	23 27	19 57	11 11	0 24	11 44	20 34	23 27
24	19 14	9 29	1 47	13 9	20 56	23 26	19 44	10 51	0 47	12 5	20 46	23 26
25	18 59	9 7	2 10	13 29	21 7	23 24	19 31	10 30	1 11	12 25	20 57	23 24
26	18 44	8 44	2 34	13 48	21 17	23 23	19 17	10 9	1 34	12 46	21 9	23 22
27	18 29	8 22	2 57	14 7	21 27	23 19	19 4	9 48	1 58	13 6	21 19	23 19
28	18 13	7 59	3 21	14 26	21 37	23 16	18 50	9 27	2 21	13 26	21 30	23 15
29	17 57	7 37	3 44	14 44	21 46	23 13	18 35	9 5	2 45	13 46	21 40	23 12
30	17 41		4 7	15 2	21 55	23 9	18 21	8 44	3 8	14 6	21 49	23 8
31	17 24		4 30		22 3		18 6	8 22		14 26		23 3

A TABLE of the Variation of the SUN's DECLINATION to every 10 Degrees of Longitude.

Daily Var.	DEGREES of LONGITUDE from the MERIDIAN of LONDON.																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
Min.	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′	′
2	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
4	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2
5	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2
6	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	3	3
7	0	0	0	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3
8	0	0	1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4
9	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
10	0	1	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5
11	0	1	1	1	2	2	2	3	3	3	4	4	4	4	5	5	5	5
12	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6
13	0	1	1	1	2	2	2	3	3	4	4	4	5	5	5	6	6	6
14	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
15	0	1	1	2	2	3	3	3	4	4	5	5	5	6	6	7	7	7
16	0	1	1	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8
17	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8
18	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
19	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
20	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10
21	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10
22	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11
23	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
24	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	11	11	12

To find the SUN's DECLINATION by the foregoing TABLES.

EACH Page of the foregoing Tables contains the Sun's Declination for the Years that it is marked with at the Top, and is divided into thirteen Columns; the firſt of which to the Left Hand ſhews the Day of the Month, and the other Twelve the Months of the Year, ſo that if it be required to find the Sun's Declination for any Day; ſuppoſe for Example, on the 21ſt of Auguſt, 1779: Firſt, I look for that Table that has 1779 at the Top of it, and then right againſt the 21ſt Day of the Month, and under Auguſt, I find 12,7, which ſhews the Sun's Declination to be 12 Degrees 7 Minutes North; according to the Title at the Top of the Column.

The Sun's Declination in theſe Tables being calculated for the Meridian of London, if you ſhould be conſiderably to the Eaſtward or to the Weſtward of London; it will cauſe ſome Alteration in it; to correct which, the

Table of the Variation of the Sun's Declination is to be uſed as follows:

Firſt, Look out the Declination for the given Day of the Month, and for the Day following it, and ſubtract the Leſſer from the Greater, the Remainder is the Daily Variation.

Second, Obſerve whether the Declination be increaſing or decreaſing, which you may know thus: If the Declination for the Day following the given Day be greateſt, then it is increaſing; but if it be leaſt, it is decreaſing.

Third, Look for the Daily Variation in the firſt Column of the Table, and ſee what Number ſtands right againſt it, and under the given Degrees of Longitude; which Number is to be uſed as follows.

If the Difference of Longitude be Eaſterly, and the Declination increaſing, it muſt be ſubtracted from the Declination found in the Tables for the given Day; but if the Declination be decreaſing, it muſt be added.

If the Difference of Longitude be Weſterly, and the Declination increaſing, it muſt be added; but if the Declination be decreaſing, it muſt be ſubtracted; the Sum in one Caſe, and the Remainder in the other, will be the Sun's Declination at Noon in the Longitude required.

Suppoſe on September 10, 1779, a Ship in Longitude 64 Degrees Weſt of London; what is the Sun's true Declination when on the Ship's Meridian?

	D. M.
Decl. at London Sept. 10, 1779,	4 54 N.
Ditto at London Sept. 11,	4 32 N.
Daily Variation of Declination	22 Miles

And becauſe the Declin. is decreaſing, the Difference muſt be ſubtracted; therefore oppoſite to 22, and under 60 Degrees of Longitude ſtands 4 Minutes, which ſubtracted from 4° 54′, gives 4° 50′, the Declin. at the Ship.

Again, ſuppoſe in Longitude 80 Degrees Eaſt, on March 20th, 1787, what is the Sun's Declination? Here the Daily Difference is 24.

	D. M.
Sun's Decl. March 20,	0 5 N.
Variation for 100 Degrees	5
Declination at Noon at Ship	0 0

Since the Declination is increaſing, and the Longitude Eaſt, it muſt be ſubtracted, and the Remainder being nothing, ſhews that the Sun is upon the Equinoctial at the Ship's Meridian.

In like Manner may the Declination be fitted to any Meridian; but it ſometimes happens that the Declination is wanted when the Sun is not upon the Meridian: In ſuch Caſes it is beſt to find the Declination for the preceding and following Noons, and take the Difference, and then ſay, as 24 Hours is to that Difference, ſo is the Hours from Noon to a Fourth Number, which being added or ſubtracted, according as the Declination is increaſing or decreaſing, and the Time being in the Fore or Afternoon, gives the Sun's Declination for the given Time.

Suppoſe it were required to find the Sun's Declination on April 14, 1791, at 8 Hours 55 Minutes in the Morning.

Firſt, I look in the Tables for the Sun's Declination, April 15, 1791, and find it to be 9° 40′; and when I look for it April 14, and find it to be 9° 28′; the Daily Difference is 22 Minutes: Then I ſay, as 24 Hours is to 22 Minutes, ſo is 20 H. 55 M. the Time elapſed ſince laſt Noon, to 19 Minutes, which added to 9° 28′, becauſe the Declination is increaſing, gives 9° 47′ for the Declination at the given Time; but had the Declination been decreaſing, the 19 Minutes muſt have been ſubtracted,

In like Manner the Declination is found for any Hour of the Day, and under any Meridian, for you have nothing more to do, than to reduce the Difference of Longitude into Time, and add to, or ſubtract it from the given Time, according as the Longitude is Eaſt or Weſt, and then find the Declination as above.

The Declinations have been carefully compared with the Nautical Almanac, and computed to the neareſt Minute, which is of ſufficient Exactneſs for determining the Latitude by Obſervation; but, in finding the Time, in order to determine the Longitude, the Declination muſt be taken out of the Nautical Almanac, it being there calculated to Minutes and Seconds.

Of Logarithmic Sines, Tangents, and Secants, to every Point and Quarter Point of the Compaſs.

Points.	Sines.	Co-ſines.	Tangents.	Co-tang.	Secants.	Co-ſecant	Points.
0	0.00000	10.00000	0.00000	Infinite.	10.00000	Infinite	8
0 ¼	8.69079	9.99947	8.69131	11.30867	10.00053	11.30921	7 ¾
0 ½	8.99130	9.99790	8.99340	11.00660	10.00210	11.00870	7 ½
0 ¾	9.16652	9.99527	9.17124	10 82875	10.00473	10.83348	7 ¼
1	9.29024	9.99157	9.29866	10.70134	10.00843	10.70976	7
1 ¼	9.38557	9.98679	9.39878	10.60121	10.01321	10.61443	6 ¾
1 ½	9.46282	9.98088	9.48194	10.51806	10.01912	10.53717	6 ½
1 ¾	9.52749	9.97385	9.55365	10.44639	10 02616	10.47251	6 ¼
2	9.58284	9.96562	9.61722	10.38278	10.03428	10.41710	6
2 ¼	9.63099	9.95616	9.67482	10.32518	10.04384	10.36901	5 ¾
2 ½	9.67339	9.94543	9.72796	10.27204	10.05457	10.32661	5 ½
2 ¾	9.71104	9.93335	9.77770	10.22230	10.06665	10.28898	5 ¼
3 0	9.74474	9.91985	9.82489	10.17511	10.08015	10.25526	5
3 ¼	9.77503	9.90483	9.87020	10.12980	10.09517	10.22497	4 ¾
3 ½	9.80236	9.88819	9.91417	10.08583	10.11181	10 19764	4 ½
3 ¾	9.82708	9.86979	9.95729	10.04270	10.13021	10.17292	4 ¼
4	9.84948	9.84948	10.0000	10.0000	10.15052	10.15052	4
	Co-ſines.	Sines.	Co-tang.	Tangents.	Co-ſecant	Secants	

A Table of Logarithms from 1 *to* 120.

No.	Log.	o. o.	Log.	o. o.	Log.	No.	Log .	No.	Log.	No.	Log.
1	0.00000	21	1.32222	41	1.61278	61	1.78533	81	1.90848	101	2.00432
2	0.30103	22	34242	42	62325	62	79239	82	91381	102	00860
3	0.47712	23	36173	43	63347	63	79934	83	91908	103	01284
4	0.60206	24	38021	44	64345	64	80618	84	92428	104	01703
5	0.69897	25	39794	45	65321	65	81291	85	92942	105	02119
6	0.77815	26	41497	46	66276	66	81954	86	93450	106	02531
7	0,84510	27	43136	47	67210	67	82607	87	93952	107	02938
8	0.90309	28	44716	48	68124	68	83251	88	94448	108	03342
9	0.95424	29	46240	49	69020	69	83885	89	94939	109	03743
10	1.00000	30	47712	50	69897	70	84510	90	95424	100	04139
11	1.04139	31	1.49136	51	1.70757	71	1.85126	91	1.95904	111	2.04532
12	07918	32	50515	52	71600	72	85733	92	96379	112	04922
13	11394	33	58151	53	72428	73	86332	93	96848	113	0530
14	14613	34	53148	54	73239	74	86923	94	97313	114	05690
15	17609	35	54407	55	74036	75	87506	95	97772	115	06070
16	20412	36	55630	56	74819	76	88081	96	98227	116	06446
17	23045	37	56820	57	75587	77	88649	97	98677	117	06819
18	25527	38	57978	58	76343	78	89209	98	99123	118	07188
19	27875	39	59106	59	77085	79	89763	99	95963	119	07555
20	30103	40	60206	60	77815	80	90309	100	2.00000	120	07918

Difference of Latitude and Departure for ¼ Point

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.0	61	60.9	03.0	121	120.9	05.9	181	180.8	08.9	241	240.7	11.8
2	02.0	00.1	62	61.9	03.0	22	121.9	06.0	82	181.8	08.9	42	241.7	11.9
3	03.0	00.1	63	62.9	03.1	23	122.9	06.0	83	182.8	09.0	43	242.7	11.9
4	04.0	00.2	64	63.9	03.1	24	123.9	06.1	84	183.8	09.0	44	243.7	12.0
5	05.0	00.2	65	64.9	03.2	25	124.9	06.1	85	184.8	09.1	45	244.7	12.0
6	06.0	00.3	66	65.9	03.2	26	125.8	06.2	86	185.8	09.1	46	245.7	12.1
7	07.0	00.3	67	66.9	03.3	27	126.8	06.2	87	186.8	09.2	47	246.7	12.1
8	08.0	00.4	68	67.9	03.3	28	127.8	06.3	88	187.8	09.2	48	247.7	12.2
9	09.0	00.4	69	68.9	03.4	29	128.8	06.3	89	188.8	09.3	49	248.7	12.2
10	10.0	00.5	70	69.9	03.4	30	129.8	06.4	90	189.8	09.3	40	249.7	12.3
11	11.0	00.5	71	70.9	03.5	131	130.8	06.4	191	190.8	09.4	251	250.7	12.3
12	12.0	00.6	72	71.9	03.5	32	131.8	06.5	92	191.8	09.4	52	251.7	12.4
13	13.0	00.6	73	72.9	03.6	33	132.8	06.5	93	192.8	09.5	53	252.7	12.4
14	14.0	00.7	74	73.9	03.6	34	133.8	06.6	94	193.8	09.5	54	253.7	12.5
15	15.0	00.7	75	74.9	03.7	35	134.8	06.6	95	194.8	09.6	55	254.7	12.5
16	16.0	00.8	76	75.9	03.7	36	135.8	06.7	96	195.8	09.6	56	255.7	12.6
17	17.0	00.8	77	76.9	03.8	37	136.8	06.7	97	196.8	09.7	57	256.7	12.6
18	18.0	00.9	78	77.9	03.8	38	137.8	06.8	98	197.8	09.7	58	257.7	12.7
19	19.0	00.9	79	78.9	03.9	39	138.8	06.8	99	198.8	09.8	59	258.7	12.7
20	20.0	01.0	80	79.9	03.9	40	139.8	06.9	200	199.8	09.8	60	259.7	12.8
21	21.0	01.0	81	80.9	04.0	141	140.8	06.9	201	200.8	09.9	261	260.7	12.8
22	22.0	01.1	82	81.9	04.0	42	141.8	07.0	02	201.8	09.9	62	261.7	12.9
23	23.0	01.1	83	82.9	04.1	43	142.8	07.0	03	202.8	10.0	63	262.7	12.9
24	24.0	01.2	84	83.9	04.1	44	143.8	07.1	04	203.8	10.0	64	263.7	13.0
25	25.0	01.2	85	84.9	04.2	45	144.8	07.1	05	204.8	10.1	65	264.7	13.0
26	26.0	01.3	86	85.9	04.2	46	145.8	07.2	06	205.8	10.1	66	265.7	13.1
27	27.0	01.3	87	86.9	04.3	47	146.8	07.2	07	206.8	10.2	67	266.7	13.1
28	28.0	01.4	88	87.9	04.3	48	147.8	07.3	08	207.8	10.2	68	267.7	13.2
29	29.0	01.4	89	88.9	04.4	49	148.8	07.3	09	208.7	10.3	69	268.7	13.2
30	30.0	01.5	90	89.9	04.4	50	149.8	07.4	10	209.7	10.3	70	269.7	13.3
31	31.0	01.5	91	90.9	04.5	151	150.8	07.4	211	210.7	10.4	271	270.7	13.3
32	32.0	01.6	92	91.9	04.5	52	151.8	07.5	12	211.7	10.4	72	271.7	13.4
33	33.0	01.6	93	92.9	04.6	53	152.8	07.5	13	212.7	10.5	73	272.7	13.4
34	34.0	01.7	94	93.9	04.6	54	153.8	07.6	14	213.7	10.5	74	273.7	13.5
35	35.0	01.7	95	94.9	04.7	55	154.8	07.6	15	214.7	10.6	75	274.7	13.5
36	36.0	01.8	96	95.9	04.7	56	155.8	07.7	16	215.7	10.6	76	275.7	13.6
37	37.0	01.8	97	96.9	04.8	57	156.8	07.7	17	216.7	10.7	77	276.7	13.6
38	38.0	01.9	98	97.9	04.8	58	157.8	07.8	18	217.7	10.7	78	277.7	13.7
39	39.0	01.9	99	98.9	04.9	59	158.8	07.8	19	218.7	10.8	79	278.7	13.7
40	40.0	02.0	100	99.9	04.9	60	159.8	07.9	20	219.7	10.8	80	279.7	13.8
41	41.0	02.0	101	100.9	05.0	161	160.8	07.9	221	220.7	10.9	281	280.7	13.8
42	41.9	02.1	02	101.9	05.0	62	161.8	08.0	22	221.7	10.9	82	281.7	13.9
43	42.9	02.1	03	102.9	05.1	63	162.8	08.0	23	222.7	11.0	83	282.7	14.9
44	43.9	02.2	04	103.9	05.1	64	163.8	08.1	24	223.7	11.0	84	283.7	14.0
45	44.9	02.2	05	104.9	05.2	65	164.8	08.1	25	224.7	11.1	85	284.7	14.0
46	45.9	02.3	06	105.9	05.2	66	165.8	08.2	26	225.7	11.1	86	285.7	14.1
47	46.9	02.3	07	106.9	05.3	67	166.8	08.2	27	226.7	11.2	87	286.7	14.1
48	47.9	02.4	08	107.9	05.3	68	167.8	08.3	28	227.7	11.2	88	287.7	14.2
49	48.9	02.4	09	108.9	05.4	69	168.8	08.3	29	228.7	11.3	89	288.7	14.2
50	49.9	02.5	10	109.9	05.4	70	169.8	08.4	30	229.7	11.3	90	289.7	14.3
51	50.9	02.5	111	110.9	05.5	171	170.8	08.4	231	230.7	11.4	291	290.7	14.3
52	51.9	02.6	12	111.9	05.5	72	171.8	08.5	32	231.7	11.4	92	291.6	14.4
53	52.9	02.6	13	112.9	05.5	73	172.8	08.5	33	232.7	11.5	93	292.6	14.4
54	53.9	02.7	14	113.9	05.6	74	173.8	08.5	34	233.7	11.5	94	293.6	14.5
55	54.9	02.7	15	114.9	05.6	75	174.8	08.6	35	234.7	11.5	95	294.6	14.5
56	55.9	02.8	16	115.9	05.7	76	175.8	08.6	36	235.7	11.6	96	295.6	14.5
57	56.9	02.8	17	116.9	05.7	77	176.8	08.7	37	236.7	11.6	97	296.6	14.6
58	57.9	02.9	18	117.9	05.8	78	177.8	08.7	38	237.7	11.7	98	297.6	14.6
59	58.9	02.9	19	118.9	05.8	79	178.8	08.8	39	238.7	11.7	99	298.6	14.7
60	59.9	02.9	20	119.9	05.9	80	179.8	08.8	40	239.7	11.8	300	299.6	14.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

A a

for 7 ¾ Points

Difference of Latitude and Departure for ½ Point.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.1	61	60.7	06.0	121	120.4	11.8	181	180.1	17.7	241	239.8	23.6
2	02.0	00.2	62	61.7	06.1	22	121.4	11.9	82	181.1	17.8	42	240.8	23.7
3	03.0	00.3	63	62.7	06.2	23	122.4	12.0	83	182.1	17.9	43	241.8	23.8
4	04.0	00.4	64	63.7	06.3	24	123.4	12.1	84	183.1	18.0	44	242.8	23.9
5	05.0	00.5	65	64.7	06.4	25	124.4	12.2	85	184.1	18.1	45	243.8	24.0
6	06.0	00.6	66	65.7	06.5	26	125.4	12.3	86	185.1	18.2	46	244.8	24.1
7	07.0	00.7	67	66.7	06.6	27	126.4	12.4	87	186.1	18.3	47	245.8	24.2
8	08.0	00.8	68	67.7	06.7	28	127.4	12.5	88	187.1	18.4	48	246.8	24.3
9	09.0	00.9	69	68.7	06.7	29	128.4	12.6	89	188.1	18.5	49	247.8	24.4
10	10.0	01.0	70	69.7	06.8	30	129.4	12.7	90	189.1	18.6	50	248.8	24.5
11	10.9	01.1	71	70.7	06.9	131	130.4	12.8	191	190.1	18.7	251	249.8	24.6
12	11.9	01.2	72	71.7	07.0	32	131.4	12.9	92	191.1	18.8	52	250.8	24.7
13	12.9	01.3	73	72.6	07.1	33	132.4	13.0	93	192.1	18.9	53	251.8	24.8
14	13.9	01.4	74	73.6	07.2	34	133.4	13.1	94	193.1	19.0	54	252.8	24.9
15	14.9	01.5	75	74.6	07.3	35	134.4	13.2	95	194.1	19.1	55	253.8	25.0
16	15.9	01.6	76	75.6	07.4	36	135.3	13.3	96	195.1	19.2	56	254.8	25.1
17	16.9	01.7	77	76.6	07.5	37	136.3	13.4	97	196.1	19.3	57	255.8	25.2
18	17.9	01.8	78	77.6	07.6	38	137.3	13.5	98	197.0	19.4	58	256.8	25.3
19	18.9	01.9	79	78.6	07.7	39	138.3	13.6	99	198.0	19.5	59	257.8	25.4
20	19.9	02.0	80	79.6	07 8	40	139.3	13.7	200	199.0	19.6	60	258.8	25.5
21	20.9	02.1	81	80.6	07.9	141	140.3	13.8	201	200.0	19.7	261	259.7	25.6
22	21.9	02.2	82	81.6	08.0	42	141.3	13.9	02	201.0	19.8	62	260.7	25.7
23	22.9	02.2	83	82.6	08.1	43	142.3	14.0	03	202.0	19.9	63	261.7	25.8
24	23.9	02.3	84	83.6	08.2	44	143.3	14.1	04	203.0	20.0	64	262.7	25.9
25	24.9	02.4	85	84.6	08.3	45	144.3	14.2	05	204.0	20.1	65	263.7	26.0
26	25.9	02.5	86	85.6	08.4	46	145.3	14.3	06	205.0	20.2	66	264.7	26.1
27	26.9	02.6	87	86.6	08.5	47	146.3	14.4	07	206.0	20.2	67	265.7	26.2
28	27.9	02.7	88	87.6	08.6	48	147.3	14.5	08	207.0	20.3	68	266.7	26.3
29	28.9	02.8	89	88.6	08.7	49	148.3	14.6	09	208.0	20.4	69	267.7	26.4
30	29.9	02.9	90	89.6	08.8	50	149.3	14.7	10	209.0	20.5	70	268.7	26.5
31	30.9	03.0	91	90.6	08.9	151	150.3	14.8	211	210.0	20.6	271	269.7	26.6
32	31.8	03.1	92	91.6	09.0	52	151.3	14.9	12	211.0	20.7	72	270.7	26.7
33	32.8	03.2	93	92.6	09.1	53	152.3	15.0	13	212.0	20.8	73	271.7	26.8
34	33.8	03.3	94	93.5	09.2	54	153.3	15.1	14	213.0	20.9	74	272.7	26.9
35	34.8	03.4	95	94.5	09.3	55	154.3	15.2	15	214.0	21.0	75	273.7	27.0
36	35.8	03.5	96	95.5	09.4	56	155.3	15.3	16	215.0	21.1	76	274.7	27.1
37	36.8	03.6	97	96.5	09.5	57	156.2	15.4	17	216.0	21.2	77	275.7	27.2
38	37.8	03.7	98	97.5	09.6	58	157.2	15.5	18	217.0	21.3	78	276.7	27.3
39	38.8	03.8	99	98.5	09.7	59	158.2	15.6	19	217.9	21.4	79	277.7	27.4
40	39.8	03.9	100	99.5	09 8	60	159.2	15.7	20	218.9	21.5	80	278.7	27.5
41	40.8	04.0	101	100.5	09.9	161	160.2	15.7	221	219.9	21.0	281	279.6	27.6
42	41.8	04.1	02	101.5	10.0	62	161.2	15.8	22	220.9	21.7	82	280.6	27.7
43	42.8	04.2	03	102.5	10.1	63	162.2	15.9	23	221.9	21.8	83	281.6	27.8
44	43.8	04.3	04	103.5	10.2	64	163.2	16.0	24	222.9	21.9	84	282.6	27.9
45	44.8	04.4	05	104.5	10.3	65	164.2	16.1	25	223.9	22.0	85	283.6	28.0
46	45.8	04.5	06	105.5	10.4	66	165.2	16.2	26	224.9	22.1	86	284.6	28.1
47	46.8	04.6	07	106.5	10.5	67	166.2	16.3	27	225.9	22.2	87	285.6	28.2
48	47.8	04.7	08	107.5	10.6	68	167.2	16.4	28	226.9	22.3	88	286.6	28.3
49	48.8	04.8	09	108.5	10.7	69	168.2	16.5	29	227.9	22.4	89	287.6	28.4
50	49.8	04.9	10	109.5	10.8	70	169.2	16.6	30	228.9	22.5	90	288.6	28.5
51	50.8	05.0	111	110.5	10.9	171	170.2	16.7	231	229.9	22.6	291	289.6	28.6
52	51.8	05.1	12	111.5	11.0	72	171.2	16.8	32	230.9	22.7	92	290.6	28.7
53	52.7	05.2	13	112.5	11.1	73	172.2	16.9	33	231.9	22.8	93	291.6	28.8
54	53.7	05.3	14	113.5	11.2	74	173.2	17.0	34	232.9	22.9	94	292.6	28.9
55	54.7	05.4	15	114.4	11.2	75	174.2	17.1	35	233.9	23.0	95	293.6	29.0
56	55.7	05.5	16	115.4	11.3	76	175.2	17.2	36	234.9	23.1	96	294.6	29.1
57	56.7	05.6	17	116.4	11.4	77	176.2	17.3	37	235.9	23.2	97	295.6	29.2
58	57.7	05.7	18	117.4	11.5	78	177.1	17.4	38	236.9	23.3	98	296.6	29.2
59	58.7	05.8	19	118.4	11.6	79	178.1	17.5	39	237.9	23.4	99	297.6	29.3
60	59.7	05.9	20	119.4	11.7	80	179.1	17.6	40	238.8	23.5	300	298 6	29.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 7 ½ Points.

Difference of Latitude and Departure for ¾ Point.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Di	Lat	Dep
1	01.0	00.1	61	60.3	08.9	121	119.7	17.7	181	179.0	26.5	241	238.4	35.3
2	02.0	00.3	62	61.3	09.1	22	120.7	17.8	82	180.0	26.7	42	239.4	35.5
3	03.0	00.4	63	62.3	09.2	23	121.7	18.0	83	181.0	26.8	43	240.4	35.6
4	04.0	00.6	64	63.3	09.4	24	122.7	18.2	84	182.0	27.0	44	241.3	35.8
5	04.9	00.7	65	64.3	09.5	25	123.6	18.3	85	183.0	27.1	45	242.3	35.9
6	05.9	00.9	66	65.3	09.7	26	124.6	18.5	86	184.0	27.3	46	243.3	36.1
7	06.9	01.0	67	66.3	09.8	27	125.6	18.6	87	185.0	27.4	47	244.3	36.2
8	07.9	01.2	68	67.3	10.0	28	126.6	18.8	88	186.0	27.6	48	245.3	36.4
9	08.9	01.3	69	68.2	10.1	29	127.6	18.9	89	186.9	27.7	49	246.3	36.5
10	09.9	01.5	70	69.2	10.3	30	128.6	19.1	90	187.9	27.9	50	247.3	36.7
11	10.9	01.6	71	70.2	10.4	31	129.6	19.2	191	188.9	28.0	251	248.3	36.8
12	11.9	01.8	72	71.2	10.6	32	130.6	19.4	92	189.9	28.2	52	249.3	37.0
13	12.9	1.9	73	72.2	10.7	33	131.6	19.5	93	190.9	28.3	53	250.2	37.1
14	13.8	02.1	74	73.2	10.8	34	132.5	19.6	94	191.9	28.5	54	251.2	37.3
15	14.8	02.2	75	74.2	11.0	35	133.5	19.8	95	192.9	28.6	55	252.2	37.4
16	15.8	02.3	76	75.2	11.1	36	134.5	19.9	96	193.9	28.7	56	253.2	37.5
17	16.8	02.5	77	76.2	11.2	37	135.5	20.1	97	194.9	28.9	57	254.2	37.7
18	17.8	02.6	78	77.1	11.4	38	136.5	20.2	98	195.8	29.0	58	255.2	37.8
19	18.8	02.8	79	78.1	11.6	39	137.5	20.4	99	196.8	29.2	59	256.2	38.0
20	19.8	02.9	80	79.1	11.7	40	138.5	20.5	200	197.8	29.3	60	257.2	38.1
21	20.8	03.1	81	80.1	11.9	41	139.5	20.7	201	198.8	29.5	261	258.2	38.3
22	21.8	03.2	82	81.1	12.0	42	140.5	20.8	02	199.8	29.6	62	259.1	38.4
23	22.7	03.4	83	82.1	12.2	43	141.4	21.0	03	200.8	29.8	63	260.1	38.6
24	23.7	03.5	84	83.1	12.3	44	142.4	21.1	04	201.8	29.9	64	261.1	38.7
25	24.7	03.7	85	84.1	12.5	45	143.4	21.3	05	202.8	30.1	65	262.1	38.9
26	25.7	03.8	86	85.1	12.6	46	144.4	21.4	06	203.8	30.2	66	263.1	39.0
27	26.7	04.0	87	86.1	12.8	47	145.4	21.6	07	204.7	30.4	67	264.1	39.2
28	27.7	04.1	88	87.0	12.9	48	146.4	21.7	08	205.7	30.5	68	265.1	39.3
29	28.7	04.3	89	88.0	13.0	49	147.4	21.8	09	206.7	30.6	69	266.1	39.5
30	29.7	04.4	90	89.0	13.2	50	148.4	22.0	10	207.7	30.8	70	267.1	39.6
31	30.7	04.5	91	90.0	13.3	151	149.4	22.1	211	208.7	30.9	271	268.1	39.7
32	31.7	04.7	92	91.0	13.5	52	150.3	22.3	12	209.7	31.1	72	269.0	39.9
33	32.6	04.8	93	92.0	13.6	53	151.3	22.4	13	210.7	31.2	73	270.0	40.0
34	33.6	05.0	94	93.0	13.8	54	152.3	22.6	14	211.7	31.4	74	271.0	40.2
35	34.6	05.1	95	94.0	13.9	55	153.3	22.7	15	212.7	31.5	75	272.0	40.3
36	35.6	05.3	96	95.0	14.1	56	154.3	22.9	16	213.7	31.7	76	273.0	40.5
37	36.6	05.4	97	95.9	14.2	57	155.3	23.0	17	214.6	31.8	77	274.0	40.6
38	37.6	05.6	98	96.9	14.4	58	156.3	23.2	18	215.6	32.0	78	275.0	40.8
39	38.6	05.7	99	97.9	14.5	59	157.3	23.3	19	216.6	32.1	79	276.0	40.9
40	39.6	05.9	100	98.9	14.7	60	158.3	23.5	20	217.6	32.3	80	277.0	41.1
41	40.6	06.0	101	99.9	14.8	161	159.2	23.6	221	218.6	32.4	181	277.9	41.2
42	41.5	06.2	02	100.9	15.0	62	160.2	23.8	22	219.6	32.6	82	278.9	41.4
43	42.5	06.3	03	101.9	15.1	63	161.2	23.9	23	220.6	32.7	83	279.9	41.5
44	43.5	06.5	04	102.9	15.3	64	162.2	24.0	24	221.6	32.8	84	280.9	41.6
45	44.5	06.6	05	103.9	15.4	65	163.2	24.2	25	222.6	33.0	85	281.9	41.8
46	45.5	06.7	06	104.8	15.5	66	164.2	24.3	26	223.5	33.1	86	282.9	41.9
47	46.5	06.9	07	105.8	15.7	67	165.2	24.5	27	224.5	33.3	87	283.9	42.1
48	47.5	07.0	08	106.8	15.8	68	166.2	24.6	28	225.5	33.4	88	284.9	42.2
49	48.5	07.2	09	107.8	16.0	69	167.2	24.8	29	226.5	33.6	89	285.9	42.4
50	49.5	07.3	10	108.8	16.1	70	168.1	24.9	30	227.5	33.7	90	286.8	42.5
51	50.4	07.5	111	109.8	16.3	171	169.1	25.1	231	228.5	33.9	291	287.8	42.7
52	51.4	07.6	12	110.8	16.4	72	170.1	25.2	32	229.5	34.0	92	288.8	42.8
53	52.4	07.8	13	111.8	16.6	73	171.1	25.4	33	230.5	34.2	93	289.8	43.0
54	53.4	07.9	14	112.8	16.7	74	172.1	25.5	34	231.5	34.3	94	290.8	43.1
55	54.4	08.1	15	113.7	16.9	75	173.1	25.7	35	232.4	34.5	95	291.8	43.3
56	55.4	08.2	16	114.7	17.0	76	174.1	25.8	36	233.4	34.6	96	292.8	43.4
57	56.4	08.4	17	115.7	17.2	77	175.1	26.0	37	234.4	34.8	97	293.8	43.6
58	57.4	08.5	18	116.7	17.3	78	176.1	26.1	38	235.4	34.9	98	294.8	43.7
59	58.4	08.6	19	117.7	17.5	79	177.1	26.3	39	236.4	35.0	99	295.8	43.8
60	59.4	08.8	20	118.7	17.6	80	178.0	26.4	40	237.4	35.2	300	296.8	44.0
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Dep	Diſt	Dep	Lat	Diſt	Dep	Lat

for 7 ¼ Points.

Difference of Latitude and Departure for 1 Point.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.2	61	59.8	11.9	121	118.7	23.6	181	177.5	35.3	241	236.3	47.0
2	02.0	00.4	62	60.8	12.1	22	119.6	23.8	82	178.5	35.5	42	237.3	47.2
3	02.9	00.6	63	61.8	12.3	23	120.6	24.0	83	179.5	35.7	43	238.3	47.4
4	03.9	00.8	64	62.8	12.5	24	121.6	24.2	84	180.4	35.9	44	239.3	47.6
5	04.9	01.0	65	63.7	12.7	25	122.6	24.4	85	181.4	36.1	45	240.3	47.8
6	05.9	01.2	66	64.7	12.9	26	123.6	24.6	86	182.4	36.3	46	241.2	48.0
7	06.9	01.4	67	65.7	13.1	27	124.5	24.8	87	183.4	36.5	47	242.2	48.2
8	07.8	01.6	68	66.7	13.3	28	125.5	25.0	88	184.4	36.7	48	243.2	48.4
9	08.8	01.8	69	67.7	13.5	29	126.5	25.2	89	185.3	36.9	49	244.2	48.6
10	09.8	02.0	70	68.6	13.7	30	127.5	25.4	90	186.3	37.1	50	245.2	48.8
11	10.8	02.1	71	69.6	13.9	131	128.5	25.6	191	187.3	37.3	251	246.1	49.0
12	11.8	02.3	72	70.6	14.0	32	129.5	25.8	92	188.3	37.5	52	247.1	49.2
13	12.7	02.5	73	71.6	14.2	33	130.4	26.0	93	189.3	37.7	53	248.1	49.4
14	13.7	02.7	74	72.6	14.4	34	131.4	26.1	94	190.2	37.9	54	249.1	49.6
15	14.7	02.9	75	73.6	14.6	35	132.4	26.3	95	191.2	38.0	55	250.1	49.8
16	15.7	03.1	76	74.5	14.8	36	133.4	26.5	96	192.2	38.2	56	251.1	50.0
17	16.7	03.3	77	75.5	15.0	37	134.4	26.7	97	193.2	38.4	57	252.1	50.1
18	17.7	03.5	78	76.5	15.2	38	135.3	26.9	98	194.2	38.6	58	253.0	50.3
19	18.6	03.7	79	77.5	15.4	39	136.3	27.1	99	195.2	38.8	59	254.0	50.5
20	19.6	03.9	80	78.5	15.6	40	137.3	27.3	200	196.1	39.0	60	255.0	50.7
21	20.6	04.1	81	79.4	15.8	141	138.3	27.5	201	197.1	39.2	261	256.0	50.9
22	21.6	04.3	82	80.4	16.0	42	139.3	27.7	02	198.1	39.4	62	256.9	51.1
23	22.6	04.5	83	81.4	16.2	43	140.2	27.9	03	199.1	39.6	63	257.9	51.3
24	23.5	04.7	84	82.4	16.4	44	141.2	28.1	04	200.1	39.8	64	258.9	51.5
25	24.5	04.9	85	83.4	16.6	45	142.2	28.3	05	201.0	40.0	65	259.9	51.7
26	25.5	05.1	86	84.3	16.8	46	143.2	28.5	06	202.0	40.2	66	260.9	51.9
27	26.5	05.3	87	85.3	17.0	47	144.2	28.7	07	203.0	40.4	67	261.8	52.1
28	27.5	05.5	88	86.3	17.2	48	145.1	28.9	08	204.0	40.6	68	262.8	52.3
29	28.4	05.3	89	87.3	17.4	49	146.1	29.1	09	205.0	40.8	69	263.8	52.5
30	29.4	05.9	90	88.3	17.6	50	147.1	29.3	10	205.9	41.0	70	264.8	52.7
31	30.4	06.0	91	89.2	17.8	151	148.1	29.5	211	206.9	41.2	271	265.8	52.9
32	31.4	06.2	92	90.2	18.0	52	149.1	29.7	12	207.9	41.4	72	266.7	53.1
33	32.4	06.4	93	91.2	18.1	53	150.0	29.9	13	208.9	41.6	73	267.7	53.3
34	33.3	06.6	94	92.2	18.3	54	151.0	30.0	14	209.9	41.8	74	268.7	53.5
35	34.3	06.8	95	93.2	18.5	55	152.0	30.2	15	210.8	42.0	75	269.7	53.7
36	35.3	07.0	96	94.1	18.7	56	153.0	30.4	17	211.8	42.1	76	270.7	53.9
37	36.3	07.2	97	95.1	18.9	57	154.0	30.6	16	212.8	42.5	77	271.6	54.0
38	37.3	07.4	98	96.1	19.1	58	154.0	30.8	18	213.8	42.6	78	272.6	54.2
39	38.2	07.6	99	97.1	19.3	59	155.9	31.0	19	214.8	42.7	79	273.6	54.4
40	39.2	07.8	100	98.1	19.5	60	156.9	31.2	20	215.7	42.9	80	274.6	54.6
41	40.2	08.0	101	99.1	19.7	161	157.9	31.4	221	216.7	43.1	281	275.6	54.8
42	41.2	08.2	02	100.0	19.9	62	158.9	31.6	22	217.7	43.3	82	276.5	55.0
34	42.2	08.4	03	101.0	20.1	63	159.8	31.8	23	218.7	43.5	83	277.5	55.2
44	43.2	08.6	04	102.0	20.3	64	160.8	32.0	24	219.7	43.7	84	278.5	55.4
45	44.1	08.8	05	103.0	20.5	65	161.8	32.2	25	220.6	43.9	85	279.5	55.6
46	45.1	09.0	06	104.0	20.7	66	162.8	32.4	26	221.6	44.1	86	280.5	55.8
47	46.1	09.2	07	104.9	20.9	67	163.8	32.6	27	222.6	44.3	87	281.4	56.0
48	47.1	09.4	08	105.9	21.1	68	164.7	32.8	28	223.6	44.5	88	282.4	56.2
49	48.1	09.6	09	106.9	21.3	69	165.7	33.0	29	224.6	44.7	89	283.4	56.4
50	49.0	09.8	10	107.9	21.5	70	166.7	33.2	30	225.6	44.9	90	284.4	56.6
51	50.0	10.0	111	108.9	21.7	171	167.7	33.4	231	226.5	45.1	291	285.4	56.8
52	51.0	10.1	12	109.8	21.9	72	168.7	33.6	32	227.5	45.3	92	286.4	57.0
53	52.0	10.3	13	110.8	22.0	73	169.7	33.8	33	228.5	45.5	93	287.3	57.2
54	53.0	10.5	14	111.8	22.2	74	170.6	34.0	34	229.5	45.7	94	288.3	57.3
55	53.9	10.7	15	112.8	22.4	75	171.6	34.1	35	230.5	45.9	95	289.3	57.6
56	54.9	10.9	16	113.8	22.6	76	172.9	34.3	36	231.4	46.0	96	290.3	57.8
57	55.9	11.1	17	114.7	22.8	77	173.6	34.5	37	232.4	46.2	97	291.3	58.0
58	56.9	11.3	18	115.7	23.0	78	174.6	34.7	38	233.4	46.4	98	292.2	58.1
59	57.9	11.5	19	116.7	23.2	79	175.5	34.9	39	234.4	46.6	99	293.2	58.3
60	58.8	11.7	20	117.7	23.4	80	176.5	35.1	40	235.4	46.8	300	294.2	58.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 7 Points

Difference of Latitude and Departare for 1 ¼ Point.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.2	61	59.2	14.8	121	117.4	29.4	181	175.6	44.0	241	233.8	58.6
2	01.9	00.5	62	60.1	15.1	22	118.3	29.6	82	176.5	44.2	42	234.7	58.8
3	02.9	00.7	63	61.1	15.3	23	119.3	29.9	83	177.5	44.5	43	235.7	59.0
4	03.9	01.0	64	62.1	15.6	24	120.3	30.1	84	178.5	44.7	44	236.7	59.3
5	04.9	01.2	65	63.1	15.8	25	121.3	30.4	85	179.5	45.0	45	237.7	59.5
6	05.8	01.5	66	64.0	16.0	26	122.2	30.6	86	180.4	45.2	46	238.6	59.8
7	06.8	01.7	67	65.0	16.3	27	123.2	30.9	87	181.4	45.4	47	239.6	60.0
8	07.8	01.9	68	66.0	16.5	28	124.2	31.1	88	182.4	45.7	48	240.6	60.3
9	08.7	02.2	69	66.9	16.8	29	125.1	31.3	89	183.3	45.9	49	241.5	60.5
10	09.7	02.4	70	67.9	17.0	30	126.1	31.6	90	184.3	46.2	50	242.5	60.7
11	10.7	02.7	71	68.9	17.3	131	127.1	31.8	191	185.3	46.4	251	243.5	61.0
12	11.6	02.9	72	69.8	17.5	32	128.0	32.1	92	186.2	46.7	52	244.4	61.2
13	12.6	03.2	73	70.8	17.7	33	129.0	32.3	93	187.2	46.9	53	245.4	61.5
14	13.6	03.4	74	71.8	18.0	34	130.0	32.6	94	188.2	47.1	54	246.4	61.7
15	14.6	03.6	75	72.8	18.2	35	131.0	32.8	95	189.2	47.4	55	247.4	62.0
16	15.5	03.9	76	73.7	18.5	36	131.9	33.0	96	190.1	47.6	56	248.3	62.2
17	16.5	04.1	77	74.7	18.7	37	132.9	33.3	97	191.1	47.9	57	249.3	62.5
18	17.5	04.4	78	75.7	19.0	38	133.9	33.5	98	192.1	48.1	58	250.3	62.7
19	18.4	04.6	79	76.6	19.2	39	134.8	33.8	99	193.0	48.4	59	251.2	62.9
20	19.4	04.9	80	77.6	19.4	40	135.8	34.0	100	194.0	48.6	60	252.2	63.2
21	20.4	05.1	81	78.6	19.7	141	136.8	34.3	101	195.0	48.8	261	253.2	63.4
22	21.3	05.3	82	79.5	19.9	42	137.7	34.5	02	195.9	49.1	62	254.1	63.7
23	22.3	05.6	83	80.5	20.2	43	138.7	34.7	03	196.9	49.3	63	255.1	63.9
24	23.3	05.8	84	81.5	20.4	44	139.7	35.0	04	197.9	49.6	64	256.1	64.2
25	24.3	06.1	85	82.5	20.7	45	140.7	35.2	05	198.9	49.8	65	257.1	64.4
26	25.2	06.3	86	83.4	20.9	46	141.6	35.5	06	199.8	50.1	66	258.0	64.6
27	26.2	06.6	87	84.4	21.1	47	142.6	35.7	07	200.8	50.3	67	255.0	64.9
28	27.2	06.8	88	85.4	21.4	48	143.6	36.0	08	201.8	50.5	68	260.0	65.1
29	28.1	07.0	89	86.3	21.6	49	144.5	36.2	09	202.7	50.8	69	260.9	65.4
30	29.1	07.3	90	87.3	21.9	50	145.5	36.5	10	203.7	51.0	70	261.9	65.6
31	30.1	07.5	91	88.3	22.1	151	146.5	36.7	211	204.7	51.3	271	262.9	65.9
32	31.0	07.8	92	89.2	22.4	52	147.4	36.9	12	205.6	51.5	72	263.8	66.1
33	32.0	08.0	93	90.2	22.6	53	148.4	37.2	13	206.6	51.8	73	264.8	66.3
34	33.0	08.3	94	91.2	22.8	54	149.4	37.4	14	207.6	52.0	74	265.8	66.6
35	34.0	08.5	95	92.2	23.1	55	150.4	37.7	15	208.6	52.2	75	266.8	66.8
36	34.9	08.7	96	93.1	23.3	56	151.3	37.9	16	209.5	52.5	76	267.7	67.1
37	35.9	09.0	97	94.1	23.6	57	152.3	38.2	17	210.5	52.7	77	268.7	67.3
38	36.9	09.2	98	95.1	23.8	58	153.3	38.4	18	211.5	53.0	78	269.7	67.6
39	37.8	09.5	99	96.0	24.1	59	154.2	38.6	19	212.4	53.2	79	270.6	67.8
40	38.8	09.7	100	97.0	24.3	60	155.2	38.9	20	213.4	53.5	80	271.6	68.0
41	39.8	10.0	101	98.0	24.5	161	156.2	39.1	221	214.4	53.7	281	272.6	68.3
42	40.7	10.2	02	98.9	24.8	62	157.1	39.4	22	215.3	53.9	82	273.5	68.5
43	41.7	10.4	03	99.9	25.0	63	158.1	39.6	23	216.3	54.2	83	274.5	68.8
44	42.7	10.7	04	100.9	25.3	64	159.1	39.9	24	217.3	54.4	84	275.5	69.0
45	43.7	10.9	05	101.9	25.5	65	160.1	40.1	25	218.3	54.7	85	276.5	69.3
46	44.6	11.2	06	102.8	25.8	66	161.0	40.3	26	219.2	54.9	86	277.4	69.5
47	45.6	11.4	07	103.8	26.0	67	162.0	40.6	27	220.2	55.2	87	278.4	69.7
48	46.6	11.7	08	104.8	26.2	68	163.0	40.8	28	221.2	55.4	88	279.4	70.0
49	47.5	11.9	09	105.7	26.5	69	163.9	41.1	29	222.1	55.6	89	280.3	70.2
40	48.5	12.2	10	106.7	26.7	70	164.9	41.3	30	223.1	55.9	90	281.3	70.5
51	49.5	12.4	111	107.7	27.0	171	165.9	41.6	231	224.1	56.1	291	282.3	70.7
52	50.4	12.6	12	108.6	27.2	72	166.8	41.8	32	225.0	56.4	92	283.2	71.0
53	51.4	12.9	13	109.6	27.5	73	167.8	42.0	33	226.0	56.6	93	284.2	71.2
54	52.4	13.1	14	110.6	27.7	74	168.8	42.3	34	227.0	56.9	94	285.2	71.4
55	53.4	13.4	15	111.6	27.9	75	169.8	42.5	35	228.0	57.1	95	286.2	71.7
56	54.3	13.6	16	112.5	28.2	76	170.7	42.8	36	228.9	57.3	96	287.1	71.9
57	55.3	13.9	17	113.5	28.4	77	171.7	43.0	37	229.9	57.6	97	288.1	72.2
58	56.3	14.1	18	114.5	28.7	78	172.7	43.3	38	230.9	57.8	98	289.1	72.4
59	57.2	14.3	19	115.4	28.9	79	173.6	43.5	39	231.8	58.1	99	290.0	72.7
60	58.2	14.6	20	116.4	29.2	80	174.6	43.7	40	232.8	58.3	300	291.0	72.9
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 6 ¾ Points.

Difference of Latitude and Departure for 1 ½ Point.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	61	58.4	17.7	121	115.8	35.1	81	173.2	52.5	241	230.6	69.9
2	01.9	00.6	62	59.3	18.0	22	116.8	35.4	82	174.2	52.8	42	231.6	70.2
3	02.9	00.9	63	60.3	18.3	23	117.7	35.7	83	175.1	53.1	43	232.5	70.5
4	03.8	01.2	64	61.2	18.6	24	118.7	36.0	84	176.1	53.4	44	233.5	70.8
5	04.8	01.5	65	62.2	18.9	25	119.6	36.3	85	177.0	53.7	45	234.5	71.0
6	05.7	01.7	66	63.2	19.1	26	120.6	36.5	86	178.0	53.9	46	235.4	71.3
7	06.7	02.0	67	64.1	19.4	27	121.5	36.8	87	179.0	54.2	47	236.4	71.6
8	07.7	02.3	68	65.1	19.7	28	122.5	37.1	88	179.9	54.5	48	237.3	71.9
9	08.6	02.6	69	66.0	20.0	29	123.5	37.4	89	180.9	54.8	49	238.3	72.2
10	09.6	02.9	70	67.0	20.3	30	124.4	37.7	90	181.8	55.1	40	239.2	72.5
11	10.5	03.2	71	67.9	20.6	131	125.4	38.0	91	182.8	55.4	251	240.2	72.8
12	11.5	03.5	72	68.8	20.9	32	126.3	38.3	92	183.7	55.7	52	241.2	73.1
13	12.4	03.8	73	69.9	21.2	33	127.3	38.6	93	184.7	56.0	53	242.1	73.4
14	13.4	04.1	74	70.8	21.5	34	128.2	38.9	94	185.7	56.3	54	243.1	73.7
15	14.4	04.4	75	71.8	21.8	35	129.2	39.2	95	186.6	56.6	55	244.0	74.0
16	15.3	04.6	76	72.7	22.0	36	130.2	39.4	96	187.6	56.8	56	245.0	74.2
17	16.3	04.9	77	73.7	22.3	37	131.1	39.7	67	188.5	57.1	57	245.9	74.5
18	17.2	05.2	78	74.6	22,6	38	132.1	40.0	98	189.5	57.4	58	246.9	74.8
19	18.2	05.5	79	75.6	22.9	39	133.0	40.3	99	190.4	57.7	59	247.9	75.1
20	19.1	05.8	80	76.6	23.2	40	134.0	40.6	200	191.4	58.0	60	248.8	75.4
21	20.1	06.1	81	77.5	23.5	141	134.9	40.9	201	192.4	58.3	261	249.8	75.7
22	21.1	06.4	82	78.5	23.8	42	135.9	41.2	02	193.3	58.6	62	250.7	76.0
23	22.0	06.7	83	79.4	24.1	43	136.9	41.5	03	194.3	58.9	63	251.7	76.3
24	23.0	07.0	84	80.4	24.4	44	137.8	41.8	04	195.2	59.2	64	252.6	76.6
25	23.9	07.3	85	81.3	24.7	45	138.8	42.1	05	196.2	59.5	65	253.6	76.9
26	24.9	07.5	86	82.3	24.9	46	139.7	42.3	06	197.1	59.7	66	254.6	77.1
27	25.8	07.8	87	83.3	25.2	47	140.7	42.6	07	198.1	60.0	67	255.5	77.4
28	26.8	08.1	88	84.2	25.5	48	141.6	42.9	08	199.1	60.3	68	256.5	77.7
29	27.8	08.4	89	85.2	25.8	49	142.6	43.2	09	200.0	60.6	69	257.4	78.0
30	28.7	08.7	90	86.1	26.1	50	143.5	43.5	10	201.0	60.9	70	258.4	78.3
31	29.7	09.0	91	87.1	26.4	151	144.5	43.8	211	201.9	61.2	271	259.3	78.6
32	30.6	09.3	92	88.0	26.7	52	145.5	44.1	12	202.9	61.5	72	260.3	78.9
33	31.6	09.6	93	89.0	27.0	53	146.4	44.4	13	203.8	61.8	73	261.3	79.2
34	32.5	09.9	94	90.0	27.3	54	147.4	44.7	14	204.8	62.1	74	262.2	79.5
35	33.5	10.2	95	90.9	27.6	55	148.3	45.0	15	205.8	62.4	75	263.2	79.8
36	34.5	10.4	96	91.9	27.8	56	149.3	45.2	16	206.7	62.6	76	264.1	80.0
37	35.4	10.7	97	92.8	28.1	57	150.2	45.5	17	207.7	62.9	77	265.1	80.3
38	36.4	11.0	98	93.8	28.4	58	151.2	45.8	18	208.6	63.2	78	266.0	80.6
39	37.3	11.3	99	94.7	28.7	59	152.2	46.1	19	209.6	63.5	79	267.0	80.9
40	38.3	11.6	100	95.7	29.0	60	153.1	46.4	20	210.5	63.8	80	268.0	81.2
41	39.2	11.9	101	96.7	29.3	161	154.1	46.7	221	211.5	64.1	281	268.9	81.5
42	40.2	12.2	02	97.6	29.6	62	155.0	47.0	22	212.5	64.4	82	269.9	81.8
43	41.2	12.5	03	98.6	29.9	63	156.0	47.3	23	213.4	64.7	83	270.8	82.1
44	42.1	12.8	04	99.5	30.2	64	156.9	47.6	24	214.4	65.0	84	271.8	82.4
45	43.1	13.1	05	100.5	30.5	65	157.9	47.9	25	215.3	65.3	85	272.7	82.7
46	44.0	13.3	06	101.4	30.7	66	158.9	48.1	26	216.3	65.5	86	273.7	82.9
47	45.0	13.6	07	102.4	31.0	67	159.8	48.4	27	217.2	65.8	87	274.7	83.2
48	45.9	13.9	08	103.4	31.3	68	160.8	48.7	28	218.2	66.1	88	275.6	83.5
49	46.9	14.2	09	104.3	31.6	69	161.7	49.0	29	219.2	66.4	89	276.6	83.8
50	47.9	14.5	10	105.3	31.9	70	162.7	49.3	30	210.1	66.7	90	277.5	84.1
51	48.8	14.8	111	106.2	32.2	171	163.6	49.6	231	221.1	67.0	291	278.5	84.4
52	49.8	15.1	12	107.2	32.5	72	164.6	49.9	32	222.0	67.3	92	279.4	84.7
53	50.7	15.4	13	108.1	32.8	73	165.6	50.2	33	223.0	67.6	93	280.4	85.0
54	51.7	15.7	14	109.1	33.1	74	166.5	50.5	34	223.9	67.9	94	281.4	85.3
55	52.6	16.0	15	110.1	33.4	75	167.5	50.8	35	224.9	68.2	95	282.3	85.6
56	53.6	16.2	16	111.0	33.6	76	168.4	51.0	36	225.9	68.4	96	283.3	85.8
57	54.5	16.5	17	112.0	33.9	77	169.4	51.3	37	226.8	68.7	97	284.2	86.1
58	55.5	16.8	18	112.9	34.2	78	170.3	51.6	38	227.8	69.0	98	285.2	86.4
59	56.5	17.1	19	113.9	34.5	79	171.3	51.9	39	228.7	69.3	99	286.1	86.7
60	57.4	17.4	20	114.8	34.8	80	172.3	52.2	40	229.7	69.6	300	287.1	87.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 6 ½ Points.

Difference of Latitude and Departure for 1 ¾ Points.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.3	61	57.4	20.5	121	113.9	40.8	181	170.4	61.0	241	226.9	81.2
2	01.9	00.7	62	58.4	20.9	22	114.9	41.1	82	171.4	61.3	42	227.8	81.5
3	02.8	01.0	63	59.3	21.2	23	115.8	41.4	83	172 3	61.6	43	228.8	81.8
4	03.8	01.3	64	60.3	21.6	24	116.7	41.8	84	173.2	62.0	44	229.7	82.2
5	04.7	01.7	65	61.2	21.9	25	117.7	42.1	85	174.2	62.3	45	230.7	82.5
6	05.6	02.0	66	62.1	22.2	26	118.6	42.4	86	175.1	62.6	46	231.6	82.9
7	06.6	02.4	67	63.1	22.6	27	119.6	42.8	87	176.1	63.0	47	232.5	83.2
8	07.5	02.7	68	64.0	22.9	28	120.5	43.1	88	177.0	63.3	48	233.5	83.5
9	08.5	03.0	69	65.0	23.2	29	121.5	43.4	89	177.9	63.7	49	234.4	83.9
10	09.4	03.4	70	65.9	23.6	30	122.4	43.8	90	178.9	64.0	50	235.4	84.2
11	10.4	03.7	71	66.8	23.9	131	123.3	44.1	191	179.8	64.3	251	236.3	84.5
12	11.3	04.0	72	67.8	24.2	32	124.3	44.5	92	180.8	64.7	52	237.3	84.9
13	12.2	04.4	73	68.8	24.6	33	125.2	44.8	93	181.7	65.0	53	238.2	85.2
14	13.2	04.7	74	69.7	24.9	34	126.2	45.1	94	182.6	65.3	54	239.1	85.5
15	14.1	05.1	75	70.6	25.3	35	127.1	45.5	95	183.6	65.7	55	240.1	85.9
16	15.1	05.4	76	71.6	25.6	36	128.0	45.8	96	184.5	66.0	56	241.0	86.2
17	16.0	05.7	77	72.5	25.9	37	129.0	46.1	97	185.5	66.3	57	242.0	86.6
18	17.0	06.1	78	73.4	26.3	38	129.9	46.5	98	186.4	66.7	58	242.9	86.9
19	17.9	06.4	79	74.4	26.6	39	130.9	46.8	99	187.4	67.0	59	243.8	87.2
20	18.8	06.7	80	75.3	26.9	40	131.8	47.2	200	188.3	67.4	60	244.8	87.6
21	19.8	07.1	81	76.3	27.3	141	132.8	47.5	201	189.2	67.7	261	245.7	87.9
22	20.7	07.4	82	77.2	27.6	42	133.7	47.8	02	190.2	68.0	62	246.7	88.2
23	21.7	07.7	83	78.1	28.0	43	134.6	48.2	03	191.1	68.4	63	247.6	88.6
24	22.6	08.1	84	79.1	28.3	44	135.6	48.5	04	192.1	68.7	64	248.6	88.9
25	23.5	08.4	85	80.0	28.6	45	136.5	48.8	05	193.0	69.0	65	249.5	89.2
26	24.5	08.8	86	81.0	29.0	46	137.5	49.2	66	194.0	69.4	66	250.4	89.6
27	25.4	09.1	87	81.9	29.3	47	138.4	49.5	07	194.9	69.7	67	251.4	89.9
28	26.4	09.4	88	82.8	29.6	48	139.3	49.8	08	195.8	70.1	68	252.3	90.3
29	27.3	09.8	89	83.8	30.0	49	140.3	50.2	09	196.8	70.4	69	253.3	90.6
30	28.2	10.1	90	84.7	30.3	50	141.2	50.5	10	197.7	70.7	70	254.2	90.9
31	29.2	10.4	91	85.7	30.6	151	142.2	50.9	211	198.7	71.1	271	255.1	91.3
32	30.1	10.8	92	86.6	31.0	52	143.1	51.2	12	199.6	71.4	72	256.1	91.6
33	31.1	11.1	93	87.6	31.3	53	144.0	51.5	13	200.5	71.7	73	257.0	91.9
34	32.0	11.5	94	88.5	31.7	54	145.0	51.9	14	201.5	72.1	74	258.0	92.3
35	33.0	11.8	95	89.4	32.0	55	145.9	52.2	15	202.4	72.4	75	258.9	92.6
36	33.9	12.1	66	90.4	32.3	56	146.9	52.5	16	203.4	72.7	76	259.9	93.0
37	34.8	12.5	97	91.3	32.7	57	147.8	52.9	17	204.3	73.1	77	260.8	93.3
38	35.8	12.8	98	92.3	33.0	58	148.8	53.2	18	205.2	73.4	78	261.7	93.6
39	36.7	13.1	99	93.2	33.3	59	149.7	53.6	19	206.2	73.8	79	262.7	94.0
40	37.7	13.5	100	94.2	33.7	60	150.6	53.9	20	207.1	74.1	80	263.6	94.3
41	38.6	13.8	101	95.1	34.0	161	151.6	54.2	221	208.1	74.4	281	264.6	94.6
42	39.5	14.1	02	96.0	34.4	62	152.5	54.6	22	209.0	74.8	82	265.5	95.0
43	40.5	14.5	03	97.0	34.7	63	153.5	54.9	23	210.0	75.1	83	266.4	95.3
44	41.4	14.8	04	97.9	35.4	64	154.4	55.2	24	210.9	75.4	84	267.4	95.6
45	42.4	15.2	05	98.9	35.4	65	155.3	55.6	25	211.8	75.8	85	268.3	96.0
46	43.3	15.5	06	99.7	35.7	66	156.3	55.9	26	212.8	76.1	86	269.3	96.3
47	44.3	15.8	07	100.8	36 0	67	157.2	56.2	27	213.7	76.5	87	270.2	96.7
48	45.2	16.2	08	101.7	36.4	68	158.2	56.6	28	214.7	76.8	88	271.2	97.0
49	46.1	16.5	09	102.7	36.7	69	159.1	56.9	29	215.6	77.1	89	272.1	97.3
50	47.1	16.8	10	103 6	37.0	70	160.1	57.3	30	216.5	77.5	90	273.0	97.7
51	48.0	17.2	111	104.5	37.4	171	161.0	57.6	231	217.5	77.8	291	274.0	98.0
52	49.0	17.5	12	105.4	37.7	72	161.9	57.9	32	218.4	78.1	92	274.9	98.3
53	49.9	17.9	13	106.4	38.1	73	162.9	58.4	33	219.4	78.5	93	2 759	98.7
54	50.8	18.2	14	107.3	38.4	74	163.8	58.6	34	220.3	78.8	64	276.8	99.0
55	51.8	18.5	15	108.3	38.7	75	164.8	58.9	35	221.3	79.1	95	277.7	99.4
56	52.7	18.9	16	109.2	39.1	76	165.7	59.5	36	222.2	79.5	96	278.7	99.7
57	53.7	19.2	17	110.2	39.4	77	166.6	59.6	37	223.1	79.8	97	279.6	100.0
58	54 6	19.5	18	111.1	39.7	78	167.6	60.0	38	224.1	80.2	98	280.6	100.4
59	55.5	19.9	19	112.0	40.1	79	168.5	60.3	39	225.0	80.5	99	281.5	100.7
60	56.5	20.2	20	113.0	40.4	80	169.5	60.6	40	226.0	80.8	300	282.5	101.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 6 ¼ Points.

Difference of Latitude and Departure for 2 Points.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	61	56.4	23.3	121	111.8	46.3	181	167.2	69.3	241	222.7	92.2
2	01.8	00.8	62	57.3	23.7	22	112.7	46.7	82	168.2	69.7	42	223.6	92.6
3	02.8	01.1	63	58.2	24.1	23	113.6	47.1	83	169.1	70.0	43	224.5	93.0
4	03.7	01.5	64	59.1	24.5	24	114.6	47.5	84	170.0	70.4	44	225.4	93.4
5	04.6	01.9	65	60.1	24.9	25	115.5	47.8	8	170.9	70.8	45	226.4	93.8
6	05.5	02.3	66	61.0	25.3	26	116.4	48.2	86	171.9	71.2	46	227.3	94.1
7	06.5	02.7	67	61.9	25.6	27	117.3	48.6	87	172.8	71.6	47	228.2	94.5
8	07.4	03.1	68	62.8	26.0	28	118.3	49.0	88	173.7	72.0	48	229.1	94.9
9	08.3	03.4	69	63.8	26.4	29	119.2	49.4	89	174.6	72.3	49	230.1	95.3
10	09.2	03.8	70	64.7	26.8	30	120.1	49.8	90	175.6	72.7	50	231.0	95.7
11	10.2	04.2	71	65.6	27.2	131	121.0	50.1	191	176.5	73.1	251	231.9	96.1
12	11.1	04.6	72	66.5	27.6	32	122.0	50.5	92	177.4	73.5	52	232.8	96.4
13	12.0	05.0	73	67.5	27.9	33	122.9	50.9	93	178.3	73.9	53	233.8	96.8
14	12.9	05.4	74	68.4	28.3	34	123.8	51.3	94	179.2	74.2	54	234.7	97.2
15	13.9	05.7	75	69.3	28.7	35	124.7	51.7	95	180.2	74.6	55	235.6	97.6
16	14.8	06.1	76	70.2	29.1	36	125.7	52.0	96	181.1	75.0	56	236.5	98.0
17	15.7	06.5	77	71.1	29.5	37	126.6	52.4	97	182.0	75.4	57	237.5	98.4
18	16.6	06.9	78	72.1	29.9	38	127.5	52.8	98	182.9	75.8	58	238.4	98.7
19	17.6	07.3	79	73.0	30.2	39	128.4	53.2	99	183.9	76.2	59	239.3	99.1
20	18.5	07.7	80	73.9	30.6	40	129.4	53.6	200	184.8	76.5	60	240.2	99.5
21	19.4	08.0	81	74.8	31.0	141	130.3	54.0	201	185.7	76.9	261	241.1	99.9
22	20.3	08.4	82	75.8	31.4	42	131.2	54.3	02	186.6	77.3	62	242.1	100.3
23	21.3	08.8	83	76.7	31.8	43	132.1	54.7	03	187.6	77.7	63	243.0	100.7
24	22.2	09.2	84	77.6	32.1	44	133.0	55.1	04	188.5	78.1	64	243.9	101.0
25	23.1	09.6	85	78.5	32.5	45	134.0	55.5	05	189.4	78.5	65	244.8	101.4
26	24.0	10.0	86	79.5	32.9	46	134.9	55.9	06	190.3	78.8	66	245.8	101.8
27	24.9	10.3	87	80.4	33.3	47	135.8	56.3	07	191.3	79.2	67	246.7	102.2
28	25.9	10.7	88	81.3	33.7	48	136.7	56.6	08	192.2	79.6	68	247.6	102.6
29	26.8	11.1	89	82.2	34.1	49	137.7	57.0	09	193.1	80.0	69	248.5	103.0
30	27.7	11.5	90	83.2	34.4	50	138.6	57.4	10	194.0	80.4	70	249.5	103.3
31	28.6	11.9	91	84.1	34.8	151	139.5	57.8	211	194.9	80.8	271	250.4	103.7
32	29.6	12.2	92	85.0	35.2	52	140.4	58.2	12	195.9	81.1	72	251.3	104.1
33	30.5	12.6	93	85.9	35.6	53	141.4	58.6	13	196.8	81.5	73	252.2	104.5
34	31.4	13.0	94	86.9	36.0	54	142.3	58.9	14	197.7	81.9	74	253.2	104.9
35	32.3	13.4	95	87.8	36.4	55	143.2	59.3	15	198.6	82.3	75	254.1	105.2
36	33.3	13.8	96	88.7	36.7	56	144.1	59.7	16	199.6	82.7	76	255.0	105.6
37	34.2	14.2	97	89.6	37.1	57	145.1	60.1	17	200.5	83.0	77	255.9	106.0
38	35.1	14.5	98	90.6	37.5	58	146.0	60.5	18	201.4	83.4	78	256.9	106.4
39	36.0	14.9	99	91.5	37.9	59	146.9	60.9	19	202.3	83.8	79	257.8	106.8
40	37.0	15.3	100	92.4	38.3	60	147.8	61.2	20	203.3	84.2	80	258.7	107.2
41	37.9	15.7	101	93.3	38.7	161	148.8	61.6	221	204.2	84.6	281	259.6	107.5
42	38.8	16.1	02	94.2	39.0	62	149.7	62.0	22	205.1	85.0	82	260.6	107.9
43	39.7	16.5	03	95.1	39.4	63	150.6	62.4	23	206.0	85.3	83	261.5	108.3
44	40.6	16.8	04	96.1	39.8	64	151.5	62.8	24	207.0	85.7	84	262.4	108.7
45	41.6	17.2	05	97.0	40.2	65	152.5	63.1	25	207.9	86.1	85	263.3	109.1
46	42.5	17.6	06	97.9	40.6	66	153.4	63.5	26	208.8	86.5	86	264.2	109.5
47	43.4	18.0	07	98.9	41.0	67	154.3	63.9	27	209.7	86.9	87	265.2	109.8
48	44.4	18.4	08	99.8	41.3	68	155.2	64.3	28	210.7	87.3	88	266.1	110.2
49	45.3	18.8	09	100.7	41.7	69	156.1	64.7	29	211.6	87.6	89	267.0	110.6
50	46.2	19.1	10	101.6	42.1	70	157.1	65.1	30	212.5	88.0	90	267.9	111.0
51	47.1	19.5	111	102.6	42.5	171	158.0	65.4	231	213.4	88.4	291	268.9	111.4
52	48.0	19.9	12	103.5	42.9	72	158.9	65.8	32	214.4	88.8	92	269.8	111.8
53	49.0	20.3	13	104.4	43.2	73	159.8	66.2	33	215.3	89.2	93	270.7	112.1
54	49.9	20.7	14	105.3	43.6	74	160.8	66.6	34	216.2	89.6	94	271.6	112.5
55	50.8	21.0	15	106.3	44.0	75	161.7	67.0	35	217.1	89.9	95	272.6	112.9
56	51.7	21.4	16	107.2	44.4	76	162.6	67.4	36	218.0	90.3	96	273.5	113.3
57	52.7	21.8	17	108.1	44.8	77	163.5	67.7	37	219.0	90.7	97	274.4	113.7
58	53.6	22.2	18	109.0	45.2	78	164.5	68.1	38	219.9	91.1	98	275.3	114.0
59	54.5	22.6	19	109.9	45.5	79	165.4	68.5	39	220.8	91.5	99	276.3	114.4
60	55.4	23.0	20	110.9	45.9	80	166.3	68.9	40	221.7	91.8	300	277.2	114.8
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 6 Points.

Difference of Latitude and Departure for 2 ¼ Points.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	61	55.1	26.1	121	109.4	51.7	181	163.6	77.4	241	217.8	103.0
2	01.8	00.9	62	56.0	26.5	22	110.3	52.2	82	164.5	77.8	42	218.7	103.5
3	02.7	01.3	63	57.0	26.9	23	111.2	52.6	83	165.4	78.2	43	219.6	103.9
4	03.6	01.7	64	57.9	27.4	24	112.1	53.0	84	166.3	78.7	44	220.5	104.3
5	04.5	02.1	65	58.8	27.8	25	113.0	53.5	85	167.2	79.1	45	221.4	104.8
6	05.4	02.6	66	59.7	28.2	26	113.9	53.9	86	168.1	79.5	46	222.4	105.2
7	06.3	03.0	67	60.6	28.6	27	114.8	54.3	87	169.0	80.0	47	223.3	105.6
8	07.2	03.4	68	61.5	29.1	28	115.7	54.7	88	169.9	80.9	48	224.2	106.0
9	08.1	03.8	69	62.4	29.5	29	116.6	55.2	89	170.8	80.8	49	225.1	106.5
10	09.0	04.3	70	63.3	29.9	30	117.5	55.6	90	171.7	81.7	50	226.0	106.9
11	09.9	04.7	71	64.2	30.4	131	118.4	56.0	191	172.6	81.7	251	226.9	107.3
12	10.8	05.8	72	65.1	30.8	32	119.3	56.4	92	173.6	82.1	52	227.8	107.8
13	11.8	05.6	73	60.0	31.2	33	120.2	56.9	93	174.5	82.5	53	228.7	108.2
14	12.7	06.0	74	66.9	31.6	34	121.1	57.2	94	175.4	83.0	54	229.6	108.6
15	13.6	06.4	75	67.8	32.1	35	122.0	57.7	95	176.3	83.4	55	230.5	109.0
16	14.5	06.8	76	68.7	32.5	36	122.9	58.2	96	177.2	83.8	56	231.4	109.5
17	15.4	07.3	77	69.6	32.9	37	123.8	58.6	97	178.1	84.2	57	232.3	109.9
18	16.3	07.7	78	70.5	33.4	38	124.7	59.0	98	179.0	84.7	58	233.2	110.3
19	17.2	08.1	79	71.4	33.8	39	125.6	59.4	99	179.9	85.1	59	234.1	110.7
20	18.1	08.6	80	72.3	34.2	40	126.5	59.9	200	180.8	85.5	60	235.0	111.2
21	19.0	09.0	81	73.2	34.6	141	127.4	60.3	201	181.7	85.9	261	235.9	111.6
22	19.9	09.4	82	74.1	35.1	42	128.4	60.7	02	182.6	86.4	62	236.8	112.0
23	20.8	09.8	83	75.0	35.5	43	129.3	61.1	03	183.5	86.8	63	237.7	112.5
24	21.7	10.3	84	75.9	35.9	44	130.2	61.6	04	184.4	87.2	64	238.6	112.9
25	22.6	10.7	85	76.8	36.3	45	131.1	62.0	05	185.3	87.7	65	239.5	113.3
26	23.5	11.1	86	77.7	36.8	46	132.0	62.4	06	186.2	88.1	66	240.4	113.7
27	24.4	11.5	87	78.6	37.2	47	132.9	62.9	07	187.1	88.5	67	241.3	114.2
28	25.3	12.0	88	79.6	37.6	48	133.8	63.3	08	188.0	88.9	68	242.2	114.6
29	26.2	12.4	89	80.5	38.1	49	134.7	63.7	09	188.9	89.4	69	243.1	115.0
30	27.1	12.8	90	81.4	38.5	50	135.6	64.1	10	189.8	89.8	70	244.0	115.5
31	28.0	13.3	91	82.3	38.9	151	136.5	64.6	211	190.7	90.2	271	245.0	115.9
32	28.9	13.7	92	83.2	39.3	52	137.4	65.0	12	191.6	90.6	72	245.9	116.3
33	29.8	14.1	93	84.1	39.8	53	138.3	65.4	13	192.5	91.1	73	246.8	116.7
34	30.7	14.5	94	85.0	40.2	54	139.2	65.8	14	193.4	91.5	74	247.7	117.2
35	31.6	15.0	95	85.9	40.6	55	140.1	66.3	15	194.3	91.9	75	248.6	117.6
36	32.5	15.4	96	86.8	41.0	56	141.0	66.7	16	195.2	92.4	76	249.5	118.0
37	33.4	15.8	97	87.7	41.5	57	141.9	67.1	17	196.1	92.8	77	250.4	118.4
38	34.4	16.2	98	88.6	41.9	58	142.8	67.6	18	197.0	93.2	78	251.3	118.9
39	35.3	16.7	99	89.5	42.3	59	143.7	68.0	19	197.9	93.6	79	252.2	119.3
40	36.2	17.1	100	90.4	42.8	66	144.6	68.4	20	198.8	94.1	80	253.1	119.7
41	37.1	17.5	101	91.3	43.2	161	145.5	68.8	221	199.8	94.5	281	254.0	120.2
42	38.0	18.0	02	92.2	43.6	62	146.4	69.3	22	200.7	94.9	82	254.9	120.6
43	38.9	18.4	03	93.1	44.0	63	147.3	69.7	23	201.6	95.4	83	255.8	121.0
44	39.8	18.8	04	94.0	44.5	64	148.2	70.1	24	202.5	95.8	84	256.7	121.4
45	40.7	19.2	05	94.9	44.9	65	149.1	70.6	25	203.4	96.2	85	257.6	121.9
46	41.6	19.7	06	95.8	45.3	66	150.0	71.0	26	204.3	96.6	86	258.5	122.3
47	42.5	20.1	07	96.7	45.8	67	151.0	71.4	27	205.2	97.1	87	259.4	122.7
48	43.4	20.5	08	97.6	46.2	68	151.9	71.8	28	206.1	97.5	88	260.3	123.1
49	44.3	21.0	09	98.5	46.6	69	152.8	72.3	29	207.0	97.9	89	261.2	123.6
50	45.2	21.4	10	99.4	47.0	70	153.7	72.7	30	207.1	98.3	90	262.1	124.0
51	46.1	21.8	111	100.3	47.5	171	154.6	73.1	231	208.8	98.8	291	263.0	124.4
52	47.0	22.2	12	101.2	47.9	72	155.5	73.5	32	209.7	99.1	92	263.9	124.9
53	47.9	22.7	13	102.1	48.3	73	156.4	74.0	33	210.6	99.6	93	264.8	125.3
54	48.8	23.1	14	103.0	48.7	74	157.3	74.4	34	211.5	100.1	94	265.7	125.7
55	49.7	23.5	15	103.9	49.2	75	158.2	74.8	35	212.4	100.5	95	266.6	126.1
56	50.6	23.9	16	104.8	49.6	76	159.1	75.3	36	213.3	100.9	96	267.6	126.6
57	51.5	24.4	17	105.8	50.0	77	160.0	75.7	37	214.2	101.3	97	268.5	127.0
58	52.4	24.8	18	106.7	50.5	78	160.9	76.1	38	215.1	101.8	98	269.4	127.4
59	53.3	25.2	19	107.6	50.9	79	161.8	76.5	39	216.0	102.2	99	270.3	127.8
60	54.2	25.7	20	108.5	51.3	80	162.7	77.0	40	216.9	102.6	300	271.2	128.3
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 5 ¾ Points.

Difference of Latitude and Departure for 2 ½ Points.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.5	61	53.8	28.7	121	106.7	57.0	181	159.6	85.3	241	212.6	113.5
2	01.8	00.9	62	54.7	29.2	22	107.6	57.5	82	160.5	85.8	42	213.4	114.0
3	02.6	01.4	63	55.6	29.7	23	108.5	58.0	83	161.4	86.2	43	214.3	114.5
4	03.5	01.9	64	56.4	30.2	24	109.4	58.4	84	162.3	86.7	44	215.2	115.0
5	04.4	02.4	65	57.3	30.6	25	110.3	58.9	85	163.2	87.2	45	216.1	115.4
6	05.3	02.8	66	58.2	31.1	26	111.0	59.4	86	164.1	87.6	46	217.0	115.9
7	06.2	03.3	67	59.1	31.6	27	112.1	59.8	87	164.9	88.1	47	217.9	116.4
8	07.1	03.8	68	60.0	32.0	28	112.9	60.3	88	165.8	88.6	48	218.7	116.8
9	07.9	04.2	69	60.9	32.5	29	113.8	60.8	89	166.7	89.1	49	219.6	117.3
10	08.8	04.7	70	61.7	33.0	30	114.7	61.3	90	167.6	89.5	50	220.5	117.8
11	09.7	05.2	71	62.6	33.5	131	115.5	61.7	191	168.5	90.0	251	221.4	108.3
12	10.6	05.7	72	63.5	33.9	32	116.4	62.2	92	169.3	90.5	52	222.3	118.7
13	11.5	06.1	73	64.4	34.4	33	117.3	62.7	93	170.2	90.9	53	223.1	119.2
14	12.3	06.6	74	65.3	34.9	34	118.2	63.1	94	171.1	91.4	54	224.0	119.7
15	13.2	07.1	75	66.2	35.3	35	119.1	63.6	95	172.0	91.9	55	224.9	120.1
16	14.2	07.5	76	67.0	35.7	36	120.0	64.1	96	172.9	92.4	56	225.8	120.6
17	15.0	08.0	77	67.9	36.3	37	120.8	64.5	97	173.8	92.8	57	226.7	121.1
18	15.9	08.5	78	68.8	36.8	38	121.7	65.0	98	174.6	93.3	58	227.6	121.6
19	16.8	09.0	79	69.7	37.2	39	122.6	65.5	99	175.5	93.8	59	228.4	122.0
20	17.6	09.4	80	70.6	37.7	40	123.5	66.0	200	176.4	94.2	60	229.3	122.5
21	18.5	09.9	81	71.4	38.2	141	124.4	66.4	201	177.3	94.7	261	230.2	123.0
22	19.4	10.4	82	72.3	38.6	42	125.2	66.9	02	178.2	95.2	62	231.1	123.4
23	20.3	10.8	83	73.2	39.1	43	126.1	67.4	03	179.0	95.6	63	232.0	123.9
24	21.2	11.3	84	74.1	39.6	44	127.0	67.8	04	179.9	96.1	64	232.8	124.4
25	22.1	11.8	85	75.0	40.1	45	127.9	68.3	05	180.8	96.6	65	233.7	124.9
26	22.9	12.3	86	75.9	40.5	46	128.8	68.8	06	181.7	97.1	66	234.6	125.3
27	23.8	12.7	87	76.7	41.0	47	129.6	69.3	07	182.6	97.5	67	235.5	125.8
28	24.7	13.2	88	77.6	41.5	48	130.5	69.7	08	183.5	98.0	68	236.4	126.3
29	25.6	13.7	89	78.5	41.9	49	131.4	70.2	09	184.3	98.5	69	237.3	126.7
30	26.5	14.1	90	79.4	42.4	50	132.3	70.7	10	185.2	98.9	70	238.1	127.2
31	27.3	14.6	91	80.3	42.9	151	133.2	71.1	211	186.1	99.4	271	239.0	127.7
32	28.2	15.1	92	81.1	43.4	52	134.1	71.6	12	187.0	99.9	72	239.9	128.2
33	29.1	15.5	93	82.0	43.8	53	134.9	72.1	13	187.9	100.4	73	240.8	128.6
34	30.0	16.0	94	82.9	44.3	54	135.8	72.6	14	188.7	100.8	74	241.7	129.1
35	30.9	16.5	95	83.8	44.8	55	136.7	73.0	15	189.6	101.3	75	242.5	129.6
36	31.8	17.0	96	84.7	45.2	56	137.6	73.5	16	190.5	101.8	76	243.4	130.0
37	32.6	17.4	97	85.6	45.7	57	138.5	74.0	17	191.4	102.2	77	244.3	130.5
38	33.5	17.9	98	86.4	46.2	58	139.4	74.4	18	192.3	102.7	78	245.2	131.0
39	34.4	18.4	99	87.3	46.6	59	140.2	74.9	19	193.2	103.2	79	246.1	131.5
40	35.3	18.8	100	88.2	47.1	60	141.1	75.4	20	194.0	103.7	80	247.0	131.9
41	36.2	19.3	101	89.1	47.6	161	142.0	75.9	221	194.9	104.1	281	247.8	132.4
42	37.0	19.8	02	90.0	48.1	62	142.9	76.3	22	195.8	104.6	82	248.7	132.9
43	37.9	20.3	03	90.8	48.5	63	143.8	76.8	23	196.7	105.1	83	249.6	133.3
44	38.8	20.7	04	91.7	49.0	64	144.6	77.3	24	197.6	105.5	84	250.5	133.8
45	39.7	21.2	05	92.6	49.5	65	145.5	77.7	25	198.4	106.0	85	251.4	134.3
46	40.6	21.7	06	93.5	49.9	66	146.4	78.2	26	199.3	106.5	86	252.3	134.8
47	41.5	22.1	07	94.4	50.4	67	147.3	78.7	27	200.2	107.0	87	253.1	135.2
48	42.3	22.6	08	95.3	50.9	68	148.2	79.2	28	201.1	107.4	88	254.0	135.7
49	43.2	23.1	09	96.1	51.4	69	149.1	79.6	29	202.0	107.9	89	254.9	130.2
50	44.1	23.6	10	97.0	51.8	70	149.9	80.1	30	202.9	108.4	90	255.8	136.6
51	45.0	24.0	11	97.9	52.3	171	150.8	80.6	231	203.7	108.8	291	256.7	137.1
52	45.9	24.5	12	98.8	52.8	72	151.7	81.0	32	204.6	109.3	92	257.5	137.6
53	46.7	25.0	13	99.7	53.2	73	152.6	81.5	33	205.5	109.8	93	258.4	138.1
54	47.6	25.4	14	100.5	53.7	74	153.5	82.0	34	206.4	110.3	94	259.3	138.5
55	48.5	25.9	15	101.4	54.2	75	154.3	82.5	35	207.3	110.7	95	260.2	139.0
56	49.4	26.4	16	102.3	54.7	76	155.2	82.9	36	208.2	111.2	96	261.1	139.5
57	50.3	26.9	17	103.2	55.1	77	156.1	83.4	37	209.0	111.7	97	262.0	139.9
58	51.2	27.3	18	104.1	55.6	78	157.0	83.9	38	209.9	112.1	98	262.8	140.4
59	52.0	27.8	19	105.0	56.1	79	157.9	84.3	39	210.8	112.6	99	263.7	140.9
60	52.9	28.3	20	105.8	56.5	80	158.8	84.8	40	211.7	113.1	300	264.6	141.4
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 5 ½ Points.

Difference of Latitude and Departure for 2¾ Points.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.6	61	52.3	31.4	121	103.8	62.2	181	155.2	93.0	241	206.7	123.9
2	01.7	01.0	62	53.2	31.9	22	104.6	62.7	82	156.1	93.5	42	207.6	124.4
3	02.6	01.5	63	54.9	32.4	23	105.5	63.2	83	157.0	94.0	43	208.4	124.9
4	03.4	02.1	64	54.9	32.9	24	106.4	63.7	84	157.8	94.6	44	209.3	125.4
5	04.3	02.6	65	55.8	33.4	25	107.2	64.2	85	158.7	95.1	45	210.1	125.9
6	05.1	03.1	66	56.6	33.9	26	108.1	64.8	86	159.5	95.6	46	211.0	126.4
7	06.0	03.6	67	57.5	34.4	27	108.9	65.3	87	160.4	96.1	47	211.9	126.9
8	06.9	04.1	68	58.3	35.0	28	109.8	65.8	88	161.2	96.6	48	212.7	127.4
9	07.7	04.6	69	59.2	35.5	29	110.6	66.3	89	162.1	97.1	49	213.6	128.0
10	08.6	05.1	70	60.0	36.0	30	111.5	66.8	90	163.0	97.6	50	214.4	128.5
11	09.4	05.7	71	60.9	36.5	131	112.4	67.3	191	163.8	98.2	251	215.3	129.0
12	10.3	06.2	72	61.8	37.0	32	113.2	67.8	92	164.7	98.7	52	216.1	129.5
13	11.2	06.7	73	62.6	37.6	33	114.1	68.4	93	165.5	99.2	53	217.0	130.0
14	12.0	07.2	74	63.5	38.0	34	114.9	68.9	94	166.4	99.7	54	217.9	130.5
15	12.5	07.7	75	64.3	38.6	35	115.8	69.4	95	167.3	100.2	55	218.7	131.0
16	13.7	08.2	76	65.2	39.1	36	116.6	69.9	96	168.1	100.7	56	219.6	131.1
17	14.6	08.7	77	66.0	39.6	37	117.5	70.4	97	169.0	101.2	57	220.4	132.1
18	15.4	09.3	78	66.9	40.1	38	118.4	70.9	98	169.8	101.8	58	221.0	132.6
19	16.3	09.8	79	67.8	40.6	39	119.2	71.4	99	170.7	102.3	59	222.1	133.1
20	17.2	10.3	80	68.6	41.1	40	120.1	72.0	200	171.5	102.8	60	223.0	133.6
21	18.0	10.8	81	69.5	41.6	141	120.9	72.5	201	172.4	103.3	261	223.9	134.1
22	18.9	11.3	82	70.3	42.2	42	121.8	73.0	02	173.3	103.8	62	224.7	134.6
23	19.7	11.8	83	71.2	42.7	43	122.7	73.6	03	174.1	104.3	63	225.6	135.2
24	20.6	12.3	84	72.0	43.2	44	123.5	74.0	04	175.0	104.8	64	226.4	135.7
25	21.4	12.9	85	72.9	43.7	45	124.4	74.6	05	175.8	105.4	65	227.3	136.2
26	22.3	13.4	86	73.8	44.2	46	125.2	75.0	06	176.7	105.9	66	228.1	136.7
27	23.2	13.9	87	74.6	44.7	47	126.1	75.6	07	177.5	106.4	67	229.0	137.2
28	24.0	14.4	88	75.5	45.2	48	126.9	76.1	08	178.4	106.9	68	229.9	137.7
29	24.9	14.9	89	76.3	45.7	49	127.8	76.6	09	179.3	107.4	69	230.7	138.2
30	25.7	15.4	90	77.2	46.3	50	128.7	77.1	10	180.1	107.9	70	231.6	138.8
31	26.6	15.9	91	78.1	46.8	151	129.5	77.0	211	181.0	108.4	271	232.4	139.3
32	27.4	16.4	92	78.9	47.3	52	130.4	78.1	12	181.8	109.0	72	233.3	139.8
33	28.3	17.0	93	79.8	47.8	53	131.2	78.6	13	182.7	109.5	73	234.2	140.3
34	29.2	17.5	94	80.6	48.3	54	132.1	79.1	14	183.5	110.0	74	235.0	140.8
35	30.0	18.0	95	81.5	48.8	55	132.9	79.7	15	184.4	110.5	75	235.9	141.3
36	30.9	18.5	96	82.3	49.3	56	133.8	80.2	16	185.3	111.0	76	236.7	141.8
37	31.7	19.0	97	83.2	49.9	57	134.7	80.7	17	186.1	111.6	77	237.6	142.4
38	32.6	19.5	98	84.1	50.4	58	135.5	81.2	18	187.0	112.0	78	238.4	142.9
39	33.5	20.0	99	84.9	50.9	59	136.4	81.7	19	187.8	112.6	79	239.3	143.4
40	34.3	20.6	100	85.8	51.4	60	137.2	82.2	20	188.7	113.1	80	240.2	143.9
41	35.2	21.1	101	86.6	51.9	161	138.1	82.7	221	189.6	113.6	281	241.0	144.4
42	36.0	21.6	02	87.5	52.4	62	138.9	83.3	22	190.4	114.1	82	241.9	144.9
43	36.9	22.9	03	88.3	52.9	63	139.8	83.8	23	191.3	114.6	83	242.7	145.4
44	37.7	22.6	04	89.2	53.4	64	140.7	84.3	24	192.1	115.1	84	243.6	146.0
45	38.6	23.1	05	90.1	54.0	65	141.5	84.8	25	193.0	115.6	85	244.4	146.5
46	39.5	23.6	06	90.9	54.5	66	142.4	85.3	26	193.8	116.1	86	245.3	147.0
47	40.3	24.2	07	91.8	55.0	67	143.2	85.8	27	194.7	116.7	87	246.2	147.5
48	41.2	24.7	08	92.6	55.5	68	144.1	86.3	28	195.6	117.2	88	247.0	148.0
49	42.0	25.2	09	93.5	56.0	69	145.0	86.9	29	196.4	117.7	89	247.7	148.6
50	42.9	25.7	10	94.3	56.5	70	145.8	87.4	30	197.3	118.2	90	248.9	149.0
51	43.7	26.2	111	95.2	57.0	171	146.7	87.9	231	198.1	118.7	291	249.6	149.6
52	44.6	26.7	12	96.1	57.6	72	147.5	88.4	32	199.0	119.2	92	250.4	150.1
53	45.5	27.2	13	96.9	58.1	73	148.4	88.9	33	199.8	119.7	93	251.3	150.6
54	46.3	27.8	14	97.8	58.6	74	149.2	89.4	34	200.7	120.3	94	252.2	151.1
55	47.2	28.3	15	98.6	59.1	75	150.1	89.9	35	201.6	120.8	95	253.0	151.6
56	48.0	28.8	16	99.5	59.6	76	151.0	90.4	36	202.4	121.3	96	253.9	152.1
57	48.9	29.3	17	100.4	60.1	77	151.8	91.0	37	203.3	121.8	97	254.7	152.6
58	49.7	29.8	18	101.2	60.6	78	152.7	91.5	38	204.1	122.3	98	255.6	153.1
59	50.6	30.3	19	102.1	61.2	79	153.5	92.0	39	205.0	122.8	99	256.5	153.8
60	51.5	30.8	20	102.9	61.7	80	154.4	92.5	40	205.8	123.3	300	257.3	154.2
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 5 ¼ Points.

Difference of Latitude and Departare for 3 Points.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	50.7	33.9	121	100.6	67.2	181	150.5	100.5	241	200.4	133.9
2	01.7	01.1	62	51.5	34.4	22	101.4	67.8	82	151.3	101.1	42	201.2	134.4
3	02.5	01.7	63	52.4	35.0	23	102.3	68.3	83	152.1	101.7	43	202.0	135.0
4	03.3	02.2	64	53.2	35.6	24	103.1	68.9	84	153.0	102.2	44	202.8	135.1
5	04.2	02.8	65	54.0	36.1	25	103.6	69.4	85	153.8	102.8	45	203.7	136.1
6	05.0	03.3	66	54.9	36.7	26	104.8	70.0	86	154.6	103.3	46	204.5	136.7
7	05.8	03.9	67	55.7	37.2	27	105.6	70.5	87	155.5	103.9	47	205.3	137.2
8	06.7	04.4	68	56.5	37.8	28	106.4	71.1	88	156.3	104.4	48	206.2	137.8
9	07.5	05.0	69	57.4	38.3	29	107.2	71.7	89	157.1	105.0	49	207.0	138.3
10	08.3	05.6	70	58.2	38.9	30	108.9	72.2	90	158.0	105.5	50	207.8	138.9
11	09.1	06.1	71	59.0	39.4	131	108.9	72.8	191	158.8	106.1	251	208.7	139.4
12	10.0	06.7	72	59.9	40.0	32	109.7	73.3	92	159.6	106.7	52	209.5	140.0
13	10.8	07.2	73	60.7	40.6	33	110.6	73.9	93	160.4	107.2	53	210.3	140.5
14	11.6	07.8	74	61.5	41.1	34	111.4	74.4	94	161.3	107.8	54	211.2	141.1
15	12.5	08.3	75	62.4	41.7	35	112.2	75.0	95	162.1	108.3	55	212.0	141.7
16	13.3	08.9	76	63.2	42.2	36	113.1	75.5	96	162.9	108.9	56	212.8	142.2
17	14.1	09.4	77	64.0	42.8	37	113.9	76.1	97	163.8	109.4	57	213.7	142.8
18	15.0	10.0	78	64.8	43.3	38	114.7	76.7	98	164.6	110.0	58	214.5	143.3
19	15.8	10.6	79	65.7	43.9	39	115.6	77.2	99	165.4	110.5	59	215.3	143.9
20	16.6	11.1	80	66.5	44.4	40	116.4	77.8	200	166.3	111.1	60	216.1	144.4
21	17.5	11.7	81	67.3	45.0	141	117.2	78.3	201	167.1	111.7	261	217.0	145.0
22	18.3	12.2	82	68.2	45.6	42	118.1	78.9	02	167.9	112.2	62	217.8	145.5
23	19.1	12.8	83	69.0	46.1	43	118.9	79.4	03	168.8	112.8	63	218.6	146.1
24	20.0	13.3	84	69.8	46.7	44	119.7	80.0	04	169.6	113.3	64	219.5	146.7
25	20.8	13.9	85	70.7	47.2	45	120.5	80.5	05	170.4	113.9	65	220.3	147.2
26	21.6	14.4	86	71.5	47.8	46	121.4	81.1	06	171.3	114.4	66	221.1	147.8
27	22.4	15.0	87	72.3	48.3	47	122.2	81.7	07	172.1	115.0	67	222.0	148.3
28	23.3	15.6	88	73.2	48.9	48	123.0	82.2	08	172.9	115.5	68	222.8	148.9
29	24.1	16.1	89	74.0	49.4	49	123.9	82.8	09	173.8	116.1	69	223.6	149.4
30	24.9	16.7	90	74.8	50.0	50	124.7	83.3	10	174.6	116.7	70	224.5	150.0
31	25.8	17.2	91	75.7	50.6	151	125.5	83.9	211	175.4	117.2	271	225.3	150.5
32	26.6	17.8	92	76.5	51.1	52	126.4	84.4	12	176.2	117.8	72	226.1	151.1
33	27.4	18.3	93	77.3	51.7	53	127.2	85.0	13	177.1	118.3	73	227.0	151.7
34	28.3	18.9	94	78.1	52.2	54	128.0	85.5	14	177.9	118.9	74	227.8	152.2
35	29.1	19.4	95	79.0	52.8	55	128.9	86.1	15	178.7	119.4	75	228.6	152.8
36	29.9	20.0	66	79.8	53.3	56	129.7	86.7	16	179.6	120.0	76	229.4	153.3
37	30.8	20.6	97	80.6	53.9	57	130.5	87.2	17	180.4	120.5	77	230.0	153.9
38	31.6	21.1	98	81.5	54.4	58	131.4	87.8	18	181.2	121.1	78	231.1	154.4
39	32.4	21.7	99	82.3	55.0	59	132.2	88.3	19	182.1	121.7	79	231.9	155.0
40	33.3	22.2	100	83.1	55.6	60	133.0	88.9	20	182.9	122.2	80	232.8	155.5
41	34.1	22.8	101	84.0	56.1	161	133.8	89.4	221	183.7	122.8	281	233.6	156.1
42	34.9	23.3	02	84.8	56.7	62	134.7	90.0	22	184.6	123.3	82	234.4	156.7
43	35.8	23.9	03	85.6	57.2	63	135.5	90.5	23	185.4	123.9	83	235.3	157.2
44	36.6	24.4	04	86.5	57.8	64	136.3	91.1	24	186.2	124.4	84	236.1	157.8
45	37.4	25.0	05	87.3	58.3	65	137.2	91.7	25	187.1	125.0	85	236.9	158.3
46	38.2	25.6	06	88.1	58.9	66	138.0	92.2	26	187.9	125.5	86	237.8	158.9
47	39.1	26.1	07	89.0	59.4	67	138.8	92.8	27	188.7	126.1	87	238.6	159.4
48	39.9	26.7	08	89.8	60.0	68	139.7	93.3	28	189.5	126.7	88	239.4	160.0
49	40.7	27.2	09	90.6	60.5	69	140.5	93.9	29	190.4	127.2	89	240.3	160.5
50	41.6	27.8	10	91.4	61.1	70	141.3	94.4	30	191.2	27.8	90	241.1	161.1
51	42.4	28.3	111	92.3	61.7	171	142.2	95.0	231	192.0	128.3	291	242.9	161.7
52	43.2	28.9	12	93.1	62.2	72	143.0	95.5	32	192.9	128.9	92	243.8	162.2
53	44.1	29.4	13	93.9	62.8	73	143.8	96.1	33	193.7	129.4	93	243.6	162.8
54	44.9	30.0	14	94.8	63.3	74	144.7	96.7	34	194.5	130.0	64	244.4	163.3
55	45.7	30.6	15	95.6	63.9	75	145.5	97.2	35	195.4	130.5	95	245.2	163.9
56	46.6	31.1	16	96.4	64.4	76	146.3	97.8	36	196.2	131.1	96	246.1	164.4
57	47.4	31.7	17	97.3	65.0	77	147.1	98.3	37	197.0	131.7	97	246.9	165.0
58	48.2	32.2	18	98.1	65.5	78	148.0	98.9	38	197.9	132.2	98	247.7	165.5
59	49.1	32.8	19	98.9	66.1	79	148.8	99.4	39	198.7	132.8	99	248.5	166.1
60	49.9	33.3	20	99.8	66.7	80	149.6	100.0	40	199.5	133.3	300	249.4	166.7
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

Points,

Difference of Latitude and Departure for 3 ¼ Points.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	49.0	36.3	121	97.2	72.1	181	145.4	107.8	241	193.5	143.0
2	01.6	01.2	62	49.8	36.9	22	98.0	72.7	82	146.2	108.4	42	194.3	144.2
3	02.4	01.8	63	50.6	37.5	23	98.8	73.3	83	147.0	109.0	43	195.1	144.8
4	03.2	02.4	64	51.4	38.1	24	99.6	73.9	84	147.8	109.6	44	195.9	145.4
5	04.0	03.0	65	52.2	38.7	25	100.4	74.5	85	148.6	110.2	45	196.7	146.
6	04.8	03.6	66	53.0	39.3	26	101.2	75.1	86	149.4	110.8	46	197.5	146.6
7	05.6	04.2	67	53.8	39.9	27	102.0	75.7	87	150.2	111.4	47	198.4	147.1
8	06.4	04.8	68	54.6	40.5	28	102.8	76.3	88	151.0	112.0	48	199.2	147.7
9	07.2	05.4	69	55.4	41.1	29	103.6	76.9	89	151.8	112.6	49	200.0	148.3
10	08.0	06.0	70	56.2	41.7	30	104.4	77.4	90	152.6	113.2	50	200.8	148.9
11	08.8	06.6	71	57.0	42.3	131	105.2	78.0	191	153.4	113.8	251	201.6	149.5
12	09.6	07.1	72	57.8	42.9	32	106.0	78.6	92	154.2	114.4	52	202.4	150.1
13	10.4	07.7	73	58.6	43.5	33	106.8	79.2	93	155.0	115.0	53	203.2	150.7
14	11.2	08.3	74	59.4	44.1	34	107.6	79.8	94	155.8	115.6	54	203.0	151.3
15	12.0	08.9	75	60.2	44.7	35	108.4	80.4	95	156.6	116.2	55	204.8	151.9
16	12.8	09.5	76	61.0	45.9	36	109.2	81.0	96	157.4	116.8	56	205.6	152.5
17	13.7	10.1	77	61.8	45.3	37	110.0	81.6	97	158.2	117.4	57	206.4	153.1
18	14.5	10.7	78	62.6	46.5	38	110.8	82.2	98	159.0	118.0	58	207.2	153.7
19	15.3	11.3	79	63.4	47.1	39	111.6	82.8	99	159.8	118.6	59	208.0	154.3
20	16.1	11.9	80	64.2	47.7	40	112.4	83.4	200	160.6	119.1	60	208.8	154.9
21	16.9	12.5	81	65.0	48.3	141	113.2	84.0	201	161.4	119.7	261	209.6	155.5
22	17.7	13.1	82	65.8	48.9	42	114.0	84.6	02	162.2	120.3	62	210.4	156.1
23	18.5	13.7	83	66.7	49.4	43	114.8	85.2	03	163.0	120.9	63	211.2	156.7
24	19.3	14.3	84	67.5	50.0	44	115.6	85.8	04	163.8	121.5	64	212.0	157.3
25	20.1	14.9	85	68.3	50.6	45	116.4	86.4	05	164.6	122.1	65	212.8	157.9
26	20.9	15.5	86	69.1	51.2	46	117.2	87.0	06	165.4	122.7	66	213.6	158.5
27	21.7	16.1	87	69.9	51.8	47	118.0	87.6	07	166.2	123.3	67	214.4	159.1
28	22.5	16.7	88	70.7	52.4	48	118.8	88.2	08	167.0	123.9	68	215.2	159.7
29	23.3	17.3	89	71.5	53.0	49	119.7	88.8	09	167.8	124.5	69	216.0	160.3
30	24.1	17.9	90	72.3	53.6	50	120.2	89.4	10	168.6	125.1	70	216.8	160.9
31	24.9	18.5	91	73.1	54.2	151	121.3	90.0	211	109.4	125.7	271	217.6	161.4
32	25.7	19.1	92	73.9	54.8	52	122.1	90.6	12	170.2	126.3	72	218.4	162.0
33	28.5	19.7	93	74.7	55.4	53	122.9	91.1	13	171.0	126.9	73	219.2	162.6
34	27.3	20.3	94	75.5	56.0	54	123.7	91.7	14	171.8	127.5	74	220.0	163.2
35	28.1	20.9	95	76.3	56.6	55	124.5	92.3	15	172.7	128.1	75	220.8	163.8
36	28.9	21.4	96	77.1	57.2	56	125.3	92.9	16	173.5	128.7	76	221.6	164.4
37	29.7	22.0	97	77.9	57.8	57	126.1	93.5	17	174.3	129.3	77	222.4	165.0
38	30.5	22.6	98	78.7	58.4	58	126.9	94.1	18	175.1	129.9	78	223.2	165.6
39	31.3	23.2	99	79.5	59.0	59	127.7	94.7	19	175.9	130.5	79	224.0	166.2
40	32.2	23.8	100	80.3	59.6	60	128.5	95.3	20	176.7	131.1	80	224.8	166.8
41	32.9	24.4	101	81.1	60.2	161	129.3	95.9	221	177.5	131.7	181	225.7	167.4
42	33.7	25.0	02	81.9	60.8	62	130.1	96.5	22	178.3	132.3	82	226.5	168.0
43	34.5	25.6	03	82.7	61.4	63	130.9	97.1	23	179.1	132.9	83	227.3	168.6
44	35.3	26.2	04	83.5	62.0	64	131.7	97.7	24	179.9	133.4	84	228.1	169.2
45	36.1	26.8	05	84.3	62.6	65	132.5	98.3	25	180.7	134.0	85	228.9	169.8
46	36.9	27.4	06	85.1	63.1	66	133.3	98.9	26	181.5	134.6	86	229.7	170.4
47	37.7	28.0	07	85.9	63.7	67	134.1	99.5	27	182.3	135.2	87	230.5	171.0
48	38.5	28.6	08	86.7	64.3	68	134.9	100.1	28	183.1	135.8	88	231.3	171.6
49	39.3	29.2	09	87.5	64.9	69	135.7	100.7	29	183.9	136.4	89	232.1	172.2
50	40.2	29.8	10	88.3	65.5	70	136.5	101.3	30	184.7	137.0	90	232.9	172.8
51	41.0	30.4	111	89.1	66.1	171	137.3	101.9	231	185.5	137.6	291	233.7	173.4
52	41.8	31.0	12	89.9	66.7	72	138.1	102.5	32	186.3	138.2	92	234.5	174.0
53	42.6	31.6	13	90.7	67.3	73	138.9	103.1	33	187.1	138.8	93	235.3	174.6
54	43.4	32.2	14	91.5	67.9	74	139.7	103.7	34	187.9	139.4	94	236.1	175.1
55	44.2	32.8	15	92.4	68,5	75	140.5	104.3	35	188.7	140.0	95	236.9	175.7
56	45.0	33.4	16	93.2	69.1	76	141.3	104.9	36	189.5	140.6	96	237.7	176.3
57	45.8	34.0	17	94.0	69.7	77	142.1	105.4	37	190.3	141.2	97	238.5	176.9
58	46.6	34.6	18	94.8	70.3	78	142.9	106.0	38	191.1	141.8	98	239.3	177.5
59	47.4	35.1	19	95.6	70.9	79	143.7	106.6	39	191.9	142.4	99	240.1	78.1
60	48.2	35.7	20	96.4	71.5	80	144.5	107.2	40	192.7	143.0	300	241.0	178.7
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 4 ¾ Points.

Difference of Latitude and Departure for 3 ½ Point.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	47.1	38.7	121	93.5	76.7	181	139.9	114.8	241	186.2	152.8
2	01.5	01.3	62	47.9	39.3	22	94.3	77.4	82	140.6	115.4	42	187.0	153.5
3	02.3	01.9	63	48.7	40.0	23	95.1	78.0	83	141.4	116.0	43	187.8	154.1
4	03.1	02.5	64	49.5	40.6	24	95.8	78.6	84	142.2	116.7	44	188.6	154.7
5	03.9	03.2	65	50.2	41.2	25	96.6	79.3	85	143.0	117.3	45	189.3	155.4
6	04.6	03.8	66	51.0	41.9	26	97.4	79.9	86	143.7	118.0	46	190.1	156.0
7	05.4	04.4	67	51.8	42.5	27	98.1	80.5	87	144.5	118.6	47	190.9	156.6
8	06.2	05.1	68	52.6	43.1	28	98.9	81.2	88	145.3	119.2	48	191.6	157.3
9	07.0	05.7	69	53.3	43.8	29	99.7	81.8	89	146.1	119.9	49	192.4	157.9
10	07.7	06.3	70	54.1	44.4	30	100.5	82.4	90	146.8	120.5	50	193.2	158.5
11	08.5	07.0	71	54.9	45.0	131	101.2	83.1	191	147.6	121.1	251	194.0	159.2
12	09.3	07.6	72	55.6	45.7	32	102.0	83.7	92	148.4	121.8	52	194.7	159.8
13	10.1	08.2	73	56.4	46.3	33	102.8	84.3	93	149.1	122.4	53	195.5	160.4
14	10.8	08.9	74	57.2	46.9	34	103.6	85.0	94	149.9	123.0	54	196.3	161.1
15	11.6	09.5	75	58.0	47.6	35	104.3	85.6	95	150.7	123.7	55	197.1	161.7
16	12.4	10.1	76	58.7	48.2	36	105.1	86.2	96	151.8	124.3	56	197.8	162.3
17	13.1	10.8	77	59.5	48.8	37	105.9	86.9	97	152.2	124.9	57	198.6	163.0
18	13.9	11.4	78	60.3	49.5	38	106.6	87.5	98	153.0	125.6	58	199.4	163.6
19	14.7	12.0	79	61.1	50.1	39	107.4	88.1	99	153.8	126.2	59	200.1	164.1
20	15.5	12.7	80	61.8	50.7	40	108.2	88.8	200	154.6	126.8	60	200.9	164.9
21	16.2	13.3	81	62.6	51.4	141	109.0	89.4	201	155.3	127.5	261	201.7	165.5
22	17.0	14.0	82	63.4	52.0	42	109.7	90.0	02	156.1	128.1	62	202.5	166.1
23	17.8	14.6	83	64.1	52.6	43	110.5	90.7	03	156.9	128.7	63	203.2	166.8
24	18.5	15.2	84	64.9	53.3	44	111.3	91.3	04	157.6	129.4	64	204.0	167.4
25	19.3	15.9	85	65.7	53.9	45	112.1	92.0	05	158.4	130.0	65	204.8	168.0
26	20.1	16.5	86	66.5	54.5	46	112.8	92.6	06	159.2	130.6	66	205.6	168.7
27	20.9	17.1	87	67.2	55.2	47	113.6	93.2	07	160.0	131.3	67	206.3	169.3
28	21.6	17.8	88	68.0	55.8	48	114.4	93.9	08	160.7	131.9	68	207.1	170.0
29	22.4	18.4	89	68.8	56.4	49	115.1	94.5	09	161.5	132.5	69	207.9	170.7
30	23.2	19.0	90	69.6	57.1	50	115.9	95.1	10	162.3	133.2	70	208.9	171.2
31	24.0	19.7	91	70.3	57.7	151	116.7	95.8	211	163.1	133.8	271	209.4	171.9
32	24.7	20.3	92	71.1	58.3	52	117.5	96.4	12	163.8	134.4	72	210.2	172.5
33	25.5	20.9	93	71.9	59.0	53	118.2	97.0	13	164.6	135.1	73	211.0	173.1
34	26.3	21.6	94	72.6	59.6	54	119.0	97.7	14	165.4	135.7	74	211.7	173.8
35	27.1	22.2	95	73.4	60.2	55	119.8	98.3	15	166.1	136.3	75	212.5	174.4
36	27.8	22.8	96	74.2	60.9	56	120.6	98.9	17	166.9	137.0	76	213.3	175.0
37	28.6	23.5	97	75.0	61.5	57	121.3	99.6	16	167.7	137.6	77	214.1	175.7
38	29.4	24.1	98	75.7	62.1	58	122.1	100.2	18	168.5	138.3	78	214.8	176.3
39	30.1	24.7	99	76.5	62.8	59	122.9	100.8	19	169.2	138.9	79	215.6	176.9
40	30.9	25.4	100	77.3	63.4	60	123.6	101.5	20	170.0	139.5	80	216.4	177.0
41	31.7	26.0	101	78.1	64.0	161	124.4	102.1	221	170.8	140.1	281	217.1	178.2
42	32.5	26.6	02	78.8	64.7	62	125.2	102.7	22	171.6	140.8	82	217.9	178.8
43	33.2	27.3	03	79.6	65.3	63	126.0	103.4	23	172.3	141.4	83	218.7	179.5
44	34.0	27.9	04	80.4	66.0	64	126.7	104.0	24	173.1	142.0	84	219.5	180.1
45	34.8	28.5	05	81.1	66.6	65	127.5	104.6	25	173.9	142.7	85	220.2	180.7
46	35.6	29.2	06	81.9	67.2	66	128.3	105.3	26	174.6	143.3	86	221.0	181.4
47	36.3	29.8	07	82.7	67.9	67	129.1	105.9	27	175.4	144.0	87	221.8	182.0
48	37.1	30.4	08	83.5	68.5	68	129.8	106.5	28	176.2	144.6	88	222.6	182.6
49	37.9	31.1	09	84.2	69.1	69	130.6	107.2	29	177.0	145.2	89	223.3	183.3
50	38.6	31.7	10	85.0	69.8	70	131.4	107.8	30	177.7	145.9	90	224.1	183.9
51	39.4	32.3	111	85.8	70.4	171	132.1	108.4	231	178.5	146.5	291	224.9	184.5
52	40.2	33.0	12	86.6	71.0	72	132.9	109.1	32	179.3	147.1	92	225.6	185.2
53	41.0	33.6	13	87.3	71.7	73	133.7	109.7	33	180.1	147.8	93	226.4	185.8
54	42.7	34.2	14	88.1	72.3	74	134.5	110.3	34	180.8	148.4	94	227.2	186.4
55	42.5	34.9	15	88.9	72.9	75	135.2	111.0	35	181.6	149.0	95	228.0	187.1
56	43.3	35.5	16	89.6	73.6	76	136.0	111.6	36	182.4	149.7	96	228.7	187.7
57	44.1	36.1	17	90.4	74.2	77	136.8	112.2	37	183.1	150.3	97	229.5	188.3
58	44.8	36.8	18	91.2	74.8	78	137.6	112.9	38	183.9	150.9	98	230.3	189.0
59	45.6	37.4	19	92.0	75.5	79	138.3	113.5	39	184.7	151.6	99	231.1	189.6
60	46.4	38.0	20	92.7	76.1	80	139.1	114.1	40	185.5	152.2	300	231.8	190.2
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 4 ½ Points

Difference of Latitude and Departure for 3 ¾ Point.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.7	00.7	61	45.2	41.0	121	89.6	81.2	181	134.1	121.5	241	178.5	161.6
2	01.5	01.3	62	45.9	41.6	22	90.4	81.9	82	134.8	122.2	42	179.3	162.5
3	02.2	02.0	63	46.7	42.3	23	91.1	82.6	83	135.6	122.9	43	180.0	163.2
4	03.0	02.7	64	47.4	43.0	24	91.9	83.3	84	136.3	123.5	44	180.7	163.8
5	03.7	03.4	65	48.2	43.6	25	92.6	83.9	85	137.0	124.2	45	181.5	164.5
6	04.4	04.0	66	48.9	44.3	26	93.3	84.6	86	137.8	124.9	46	182.2	165.2
7	05.2	04.7	67	49.6	45.0	27	94.1	85.3	87	138.5	125.6	47	183.0	165.8
8	05.9	05.4	68	50.4	45.7	28	94.8	85.9	88	139.3	126.2	48	183.7	166.5
9	06.7	06.0	69	51.1	46.3	29	95.6	86.6	89	140.0	126.9	49	184.4	107.2
10	07.4	06.7	70	51.9	47.0	30	96.3	87.3	90	140.7	127.6	40	185.2	167.9
11	08.2	07.4	71	52.6	47.7	131	97.0	88.0	191	141.5	128.2	251	185.9	168.5
12	08.9	08.1	72	53.3	48.3	32	97.8	88.6	92	142.2	128.9	52	186.7	169.2
13	09.6	08.7	73	54.1	49.0	33	98.5	89.3	93	143.0	129.6	53	187.4	169.9
14	10.4	09.4	74	54.8	49.7	34	99.3	90.0	94	143.7	130.3	54	188.2	170.5
15	11.1	10.1	75	55.6	50.4	35	100.0	90.6	95	144.4	130.9	55	188.9	171.2
16	11.9	10.7	76	56.3	51.0	36	100.7	91.3	96	145.2	131.0	56	189.6	171.9
17	12.6	11.4	77	57.0	51.7	37	101.5	92.0	67	145.9	132.3	57	190.4	172.6
18	13.3	12.1	78	57.8	52.4	38	102.2	92.7	98	146.7	132.9	58	191.1	173.2
19	14.1	12.8	79	58.5	53.0	39	103.0	93.3	99	147.4	133.6	59	191.9	173.9
20	14.8	13.4	80	59.3	53.7	40	103.7	94.0	200	148.2	134.3	60	192.6	174.6
21	15.6	14.1	81	60.0	54.4	141	104.4	94.7	201	148.9	135.0	261	193.3	175.2
22	16.3	14.8	82	60.7	55.1	42	105.2	95.3	02	149.6	135.6	62	194.1	175.9
23	17.0	15.4	83	61.5	55.9	43	105.9	96.0	03	150.4	136.3	63	194.8	176.6
24	17.8	19.1	84	62.2	56.4	44	106.7	96.7	04	151.1	137.0	64	195.6	177.3
25	18.5	16.8	85	63.0	57.1	45	107.4	97.4	05	151.9	137.6	65	196.3	177.9
26	19.3	17.5	86	63.7	57.7	46	108.2	98.0	06	152.6	138.3	66	197.0	178.6
27	20.0	18.1	87	64.4	58.4	47	108.9	98.7	07	153.3	139.0	67	197.8	179.3
28	20.7	18.8	88	65.2	59.1	48	109.6	99.4	08	154.1	139.7	68	198.5	179.9
29	21.5	19.5	89	65.9	59.8	49	110.4	100.0	09	154.8	140.3	69	199.3	180.6
30	22.2	20.1	90	66.7	60.4	50	111.1	100.7	10	155.6	141.0	70	200.0	181.3
31	23.0	20.8	91	67.4	61.1	151	111.9	101.4	211	156.3	141.7	271	200.7	182.0
32	23.7	21.5	92	68.2	61.8	52	112.6	102.1	12	157.0	142.3	72	201.5	182.6
33	24.4	22.2	93	68.9	62.4	53	113.3	102.7	13	157.8	143.0	73	202.2	183.3
34	25.2	22.8	94	69.6	63.1	54	114.1	103.4	14	158.5	143.7	74	203.0	184.0
35	25.9	23.5	95	70.4	63.8	55	114.8	104.1	15	159.3	144.4	75	203.7	184.6
36	26.7	24.2	96	71.1	64.5	56	115.6	104.7	16	160.0	145.0	76	204.4	185.3
37	27.4	24.8	97	71.9	65.1	57	116.3	105.4	17	160.7	145.7	77	205.2	186.0
38	28.2	25.5	98	72.6	65.8	58	117.0	106.1	18	161.5	146.4	78	205.9	186.7
39	28.9	26.2	99	73.3	66.5	59	117.8	106.8	19	162.2	147.0	79	206.7	187.3
40	29.6	26.9	100	74.1	67.1	60	118.5	107.4	20	163.0	147.7	80	207.4	188.0
41	30.4	27.7	101	74.8	67.8	161	119.3	108.1	221	163.7	148.4	281	208.2	188.7
42	31.1	28.2	02	75.6	68.5	62	120.0	108.8	22	164.4	149.1	82	208.9	189.3
43	31.9	28.9	03	76.3	69.2	63	120.7	109.4	23	165.2	149.7	83	209.6	190.0
44	32.6	29.5	04	77.0	69.8	64	121.5	110.1	24	165.9	150.4	84	210.4	190.7
45	33.3	30.2	05	77.8	70.5	65	122.2	110.8	25	166.7	151.1	85	211.1	191.4
46	34.1	30.9	06	78.5	71.2	66	123.0	111.5	26	167.4	151.7	86	211.9	192.0
47	34.8	31.6	07	79.3	71.8	67	123.7	112.1	27	168.2	152.4	87	212.6	192.7
48	35.6	32.2	08	80.0	72.5	68	124.4	112.8	28	168.9	153.1	88	213.3	193.4
49	36.3	32.9	09	80.7	73.2	69	125.2	113.5	29	169.6	153.8	89	214.1	194.0
50	37.0	33.6	10	81.5	73.9	70	125.9	114.1	30	170.4	154.6	90	214.8	194.7
51	37.8	34.2	111	82.2	74.5	171	126.7	114.8	231	171.1	155.1	291	215.6	195.4
52	38.5	34.9	12	83.0	75.2	72	127.4	115.5	32	171.9	155.8	92	216.3	196.1
53	39.3	35.6	13	83.7	75.9	73	128.2	116.2	33	172.6	156.4	93	217.0	196.7
54	40.0	36.3	14	84.4	76.5	74	128.9	116.8	34	173.3	157.1	94	217.8	197.4
55	40.7	36.9	15	85.2	77.2	75	129.6	117.5	35	174.1	157.8	95	218.5	198.1
56	41.5	37.6	16	85.9	77.9	76	130.4	118.2	36	174.8	158.5	96	219.3	198.7
57	42.2	38.3	17	86.7	78.6	77	131.1	118.8	37	175.6	159.1	97	220.0	199.4
58	43.0	38.9	18	87.4	79.2	78	131.9	119.5	38	176.3	159.8	98	220.7	200.1
59	43.7	39.6	19	88.2	79.9	79	132.6	120.2	39	177.0	160.5	99	221.5	200.8
60	44.5	40.3	20	88.9	80.6	80	133.3	120.9	40	177.8	161.1	300	222.2	201.4
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 4 ¼ Points.

Difference of Latitude and Departure for 4 Points.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.7	00.7	61	43.1	43.1	121	85.6	85.6	181	128.0	128.0	241	170.4	170.4
2	01.4	01.4	62	43.8	43.8	22	86.3	86.3	82	128.7	128.7	42	171.1	171.1
3	02.1	02.1	63	44.5	44.5	23	87.0	87.0	83	129.4	129.4	43	171.8	171.8
4	02.8	02.8	64	45.3	45.3	24	87.7	87.7	84	130.1	130.1	44	172.5	172.5
5	03.5	03.5	65	46.0	46.0	25	88.4	88.4	85	130.8	130.8	45	173.2	173.2
6	04.2	04.2	66	46.7	46.7	26	89.1	89.1	86	131.5	131.5	46	173.9	173.9
7	04.9	04.9	67	47.4	47.4	27	89.8	89.8	87	132.1	132.1	47	174.6	174.6
8	05.7	05.7	68	48.1	48.1	28	90.5	90.5	88	132.9	132.9	48	175.4	175.4
9	06.4	06.4	69	48.8	48.8	29	91.2	91.2	89	133.6	133.6	49	176.1	176.1
10	07.1	07.1	70	49.5	49.5	30	91.9	91.9	90	134.3	134.3	50	176.8	176.8
11	07.8	07.8	71	50.2	50.2	131	92.6	92.6	191	135.1	135.1	251	177.5	177.5
12	08.5	08.5	72	50.9	50.9	32	93.3	93.3	92	135.8	135.8	52	178.2	178.2
13	09.2	09.2	73	51.6	51.6	33	94.0	94.0	93	136.5	136.5	53	178.9	178.9
14	09.9	09.9	74	52.3	52.3	34	94.7	94.7	94	137.2	137.2	54	179.6	179.6
15	10.6	10.6	75	53.0	53.0	35	95.5	95.5	95	137.9	137.9	55	180.3	180.3
16	11.3	11.3	76	53.7	53.7	36	96.2	96.2	96	138.6	138.6	56	181.0	181.0
17	12.0	12.0	77	54.4	54.4	37	96.9	96.9	97	139.3	139.3	57	181.7	181.7
18	12.7	12.7	78	55.2	55.2	38	97.6	97.6	98	140.0	140.0	58	182.4	182.4
19	13.4	13.4	79	55.9	55.9	39	98.3	98.6	99	140.7	140.7	59	183.1	183.1
20	14.1	14.1	80	56.6	56.6	40	99.0	99.0	200	141.4	141.4	60	183.8	183.8
21	14.8	14.8	81	57.3	57.3	141	99.7	99.7	201	142.1	142.1	261	184.5	184.5
22	15.6	15.6	82	58.0	58.0	42	100.4	100.4	02	142.8	142.8	62	185.3	185.3
23	16.3	16.3	83	58.7	58.7	43	101.1	101.1	03	143.5	143.5	63	186.0	186.0
24	17.0	17.0	84	59.4	59.4	44	101.8	101.8	04	144.2	144.2	64	186.7	186.7
25	17.7	17.7	85	60.1	60.1	45	102.5	102.5	05	144.9	144.9	65	187.4	187.4
26	18.4	18.4	86	60.8	60.8	46	103.2	103.2	06	145.7	145.7	66	188.1	188.1
27	19.1	19.1	87	61.5	61.5	47	103.9	103.9	07	146.4	146.4	67	188.8	188.8
28	19.8	19.8	88	62.2	62.2	48	104.6	104.6	08	147.1	147.1	68	189.5	189.5
29	20.5	20.5	89	62.9	62.9	49	105.4	105.3	09	147.8	147.8	69	190.2	190.2
30	21.2	21.2	90	63.6	63.6	50	106.1	106.1	10	148.5	148.5	70	190.9	190.9
31	21.9	21.9	91	64.3	64.3	151	106.8	106.8	211	149.2	149.2	271	191.6	191.6
32	22.6	22.6	92	65.1	65.1	52	107.5	107.5	12	149.9	149.9	72	192.3	192.3
33	23.3	23.3	93	65.8	65.8	53	108.2	108.2	13	150.6	150.6	73	193.0	193.0
34	24.0	24.0	94	66.5	66.5	54	108.9	108.9	14	151.3	151.3	74	193.7	193.7
35	24.7	24.7	95	67.2	67.2	55	109.6	109.6	15	152.0	152.0	75	194.4	194.4
36	25.5	25.5	96	67.9	67.9	56	110.3	110.3	16	152.7	152.7	76	195.2	195.2
37	26.2	26.2	97	68.6	68.6	57	111.0	111.0	17	153.4	153.4	77	195.9	195.9
38	26.9	26.9	98	69.3	69.3	58	111.7	111.7	18	154.1	154.1	78	196.6	196.6
39	27.6	27.6	99	70.0	70.0	59	112.4	112.4	19	154.8	154.8	79	197.3	197.3
40	28.3	28.3	100	70.7	70.7	60	113.1	113.1	20	155.6	155.6	80	198.0	198.0
41	29.0	29.0	101	71.4	71.4	161	113.8	113.8	221	156.3	156.3	281	198.7	198.7
42	29.7	29.7	02	72.1	72.1	62	114.5	114.5	22	157.0	157.0	82	199.4	199.4
43	30.4	30.4	03	72.8	72.8	63	115.3	115.3	23	157.7	157.7	83	200.1	200.1
44	31.1	31.1	04	73.5	73.5	64	116.0	116.0	24	158.4	158.4	84	200.8	200.8
45	31.8	31.8	05	74.2	74.2	65	116.7	116.7	25	159.1	159.1	85	201.5	201.5
46	32.5	32.5	06	74.9	74.9	66	117.4	117.4	26	159.8	159.8	86	202.2	202.2
47	33.2	33.2	07	75.7	75.7	67	118.1	118.1	27	160.5	160.5	87	202.9	202.9
48	33.9	33.9	08	76.4	76.4	68	118.8	118.8	28	161.2	161.2	88	203.6	203.6
49	34.6	34.6	09	77.1	77.1	69	119.5	119.5	29	161.9	161.9	89	204.3	204.3
50	35.4	35.4	10	77.8	77.8	70	120.2	120.2	30	162.6	162.6	90	205.1	205.1
51	36.1	36.1	111	78.5	78.5	171	120.9	120.9	231	163.3	163.3	291	205.8	205.8
52	36.8	36.8	12	79.2	79.2	72	121.6	121.6	32	164.0	164.0	92	206.5	206.5
53	37.5	37.5	13	79.9	79.9	73	122.3	122.3	33	164.7	164.7	93	207.2	207.2
54	38.2	38.2	14	80.6	80.6	74	123.0	123.0	34	165.5	165.5	94	207.9	207.9
55	38.9	38.9	15	81.3	81.3	75	123.7	123.7	35	166.2	166.2	95	208.6	208.6
56	39.6	39.6	16	82.0	82.0	76	124.4	124.4	36	166.9	166.9	96	209.3	209.3
57	40.3	40.3	17	82.7	82.7	77	125.2	125.2	37	167.6	167.6	97	210.0	210.0
58	41.0	41.0	18	83.4	83.4	78	125.9	125.9	38	168.3	168.3	98	210.7	210.7
59	41.7	41.7	19	84.1	84.1	79	126.6	126.6	39	169.0	169.0	99	211.4	211.4
60	42.4	42.4	20	84.8	84.8	80	127.3	127.3	40	169.7	169.7	100	212.1	212.1
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 4 Points.

Difference of Latitude and Departure for 1 Degree.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.0	61	61.0	01.1	121	121.0	02.1	181	181.0	03.1	241	241.0	04.1
2	02.0	00.0	62	62.0	01.1	22	122.0	02.1	82	182.0	03.1	42	242.0	04.2
3	03.0	00.1	63	63.0	01.1	23	123.0	02.1	83	183.0	03.2	43	243.0	04.2
4	04.0	00.1	64	64.0	01.1	24	124.0	02.2	84	184.0	03.2	44	244.0	04.2
5	05.0	00.1	65	65.0	01.1	25	125.0	02.2	85	185.0	03.2	45	245.0	04.2
6	06.0	00.1	66	66.0	01.2	26	126.0	02.2	86	186.0	03.2	46	246.0	04.2
7	07.0	00.1	67	67.0	01.2	27	127.0	02.2	87	187.0	03.2	47	247.0	04.2
8	08.0	00.1	68	68.0	01.2	28	128.0	02.2	88	188.0	03.2	48	248.0	04.3
9	09.0	00.2	69	69.0	01.2	29	129.0	02.2	89	189.0	03.3	49	249.0	04.3
10	10.0	00.2	70	70.0	01.2	30	130.0	02.3	90	190.0	03.3	50	250.0	04.3
11	11.0	00.2	71	71.0	01.2	131	131.0	02.3	191	191.0	03.3	251	251.0	04.3
12	12.0	00.2	72	72.0	01.3	32	132.0	02.3	92	192.0	03.3	52	252.0	04.3
13	13.0	00.2	73	73.0	01.3	33	133.0	02.3	93	193.0	03.3	53	253.0	04.3
14	14.0	00.2	74	74.0	01.3	34	134.0	02.3	94	194.0	03.3	54	254.0	04.4
15	15.0	00.3	75	75.0	01.3	35	135.0	02.3	95	195.0	03.4	55	255.0	04.4
16	16.0	00.3	76	76.0	01.3	36	136.0	02.4	96	196.0	03.4	56	256.0	04.4
17	17.0	00.3	77	77.0	01.3	37	137.0	02.4	97	197.0	03.4	57	257.0	04.4
18	18.0	00.3	78	78.0	01.4	38	138.0	02.4	98	198.0	03.4	58	258.0	04.4
19	19.0	00.3	79	79.0	01.4	39	139.0	02.4	99	199.0	03.4	59	259.0	04.4
20	20.0	00.4	80	80.0	01.4	40	140.0	02.4	200	200.0	03.4	60	260.0	04.5
21	21.0	00.4	81	81.0	01.4	141	141.0	02.4	201	201.0	03.5	261	261.0	04.5
22	22.0	00.4	82	82.0	01.4	42	142.0	02.5	02	202.0	03.5	62	262.0	04.5
23	23.0	00.4	83	83.0	01.5	43	143.0	02.5	03	203.0	03.5	63	263.0	04.5
24	24.0	00.4	84	84.0	01.5	44	144.0	02.5	04	204.0	03.5	64	264.0	04.5
25	25.0	00.4	85	85.0	01.5	45	145.0	02.5	05	205.0	03.5	65	265.0	04.6
26	26.0	00.5	86	86.0	01.5	46	146.0	02.5	06	206.0	03.5	66	266.0	04.6
27	27.0	00.5	87	87.0	01.5	47	147.0	02.5	07	207.0	03.6	67	267.0	04.6
28	28.0	00.5	88	88.0	01.5	48	148.0	02.6	08	208.0	03.6	68	268.0	04.6
29	29.0	00.5	89	89.0	01.6	49	149.0	02.6	09	209.0	03.6	69	269.0	04.6
30	30.0	00.5	90	90.0	01.6	50	150.0	02.6	10	210.0	03.6	70	270.0	04.6
31	31.0	00.5	91	91.0	01.6	151	151.0	02.6	211	211.0	03.6	271	271.0	04.7
32	32.0	00.6	92	92.0	01.6	52	152.0	02.6	12	212.0	03.6	72	272.0	04.7
33	33.0	00.6	93	93.0	01.6	53	153.0	02.7	13	213.0	03.7	73	273.0	04.7
34	34.0	00.6	94	94.0	01.6	54	154.0	02.7	14	214.0	03.7	74	274.0	04.7
35	35.0	00.6	95	95.0	01.7	55	155.0	02.7	15	215.0	03.7	75	275.0	04.7
36	36.0	00.6	96	96.0	01.7	56	156.0	02.7	16	216.0	03.7	76	276.0	04.7
37	37.0	00.6	97	97.0	01.7	57	157.0	02.7	17	217.0	03.7	77	277.0	04.8
38	38.0	00.7	98	98.0	01.7	58	158.0	02.7	18	218.0	03.8	78	278.0	04.8
39	39.0	00.7	99	99.0	01.7	59	159.0	02.7	19	219.0	03.8	79	279.0	04.8
40	40.0	00.7	100	100.0	01.7	60	160.0	02.8	20	220.0	03.8	80	280.0	04.8
41	41.0	00.7	101	101.0	01.8	161	161.0	02.8	221	221.0	03.8	281	281.0	04.8
42	42.0	00.7	02	102.0	01.8	62	162.0	02.8	22	222.0	03.8	82	282.0	04.8
43	43.0	00.8	03	103.0	01.8	63	163.0	02.8	23	223.0	03.8	83	283.0	04.9
44	44.0	00.8	04	104.0	01.8	64	164.0	02.8	24	224.0	03.9	84	284.0	04.9
45	45.0	00.8	05	105.0	01.8	65	165.0	02.9	25	225.0	03.9	85	285.0	04.9
46	46.0	00.8	06	106.0	01.8	66	166.0	02.9	26	226.0	03.9	86	286.0	04.9
47	47.0	00.8	07	107.0	01.9	67	167.0	02.9	27	227.0	03.9	87	287.0	04.9
48	48.0	00.8	08	108.0	01.9	68	168.0	02.9	28	228.0	03.9	88	288.0	04.9
49	49.0	00.9	09	109.0	01.9	69	169.0	02.9	29	229.0	03.9	89	289.0	05.0
50	50.0	00.9	10	110.0	01.9	70	170.0	02.9	30	230.0	04.0	90	290.0	05.0
51	51.0	00.9	111	111.0	01.9	171	171.0	03.0	231	231.0	04.0	291	291.0	05.0
52	52.0	00.9	12	112.0	01.9	72	172.0	03.0	32	232.0	04.0	92	292.0	05.0
53	53.0	00.9	13	113.0	02.0	73	173.0	03.0	33	233.0	04.0	93	293.0	05.0
54	54.0	00.9	14	114.0	02.0	74	174.0	03.0	34	234.0	04.0	94	294.0	05.0
55	55.0	01.0	15	115.0	02.0	75	175.0	03.0	35	235.0	04.0	95	295.0	05.1
56	56.0	01.0	16	116.0	02.0	76	176.0	03.0	36	236.0	04.1	96	296.0	05.1
57	57.0	01.0	17	117.0	02.0	77	177.0	03.1	37	237.0	04.1	97	297.0	05.1
58	58.0	01.0	18	118.0	02.1	78	178.0	03.1	38	238.0	04.1	98	298.0	05.1
59	59.0	01.0	19	119.0	02.1	79	179.0	03.1	39	239.0	04.1	99	299.0	05.1
60	60.0	01.1	20	120.0	02.1	80	180.0	03.1	40	240.0	04.1	300	300.0	05.1
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 89 Deg.

Difference of Latitude and Departure for 2 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.0	61	61.0	02.1	121	120.9	04.2	181	180.9	06.3	241	240.9	08.4
2	02.0	00.1	62	62.0	02.2	22	121.9	04.3	82	181.9	06.4	42	241.9	08.5
3	03.0	00.1	63	63.0	02.2	23	122.9	04.3	83	182.9	06.4	43	242.9	08.5
4	04.0	00.1	64	64.0	02.2	24	123.9	04.3	84	183.9	06.4	44	243.9	08.5
5	05.0	00.2	65	65.0	02.3	25	124.9	04.4	85	184.9	06.5	45	244.9	08.6
6	06.0	00.2	66	66.0	02.3	26	125.9	04.4	86	185.9	06.5	46	245.9	08.6
7	07.0	00.2	67	67.0	02.3	27	126.9	04.4	87	186.9	06.5	47	246.9	08.6
8	08.0	00.3	68	68.0	02.4	28	127.9	04.5	88	187.9	06.6	48	247.9	08.7
9	09.0	00.3	69	69.0	02.4	29	128.9	04.5	89	188.9	06.6	49	248.9	08.7
10	10.0	00.3	70	70.0	02.4	30	129.9	04.6	90	189.9	06.7	50	249.9	08.8
11	11.0	00.4	71	71.0	02.5	131	130.9	04.6	191	190.9	06.7	251	250.8	08.8
12	12.0	00.4	72	72.0	02.5	32	131.9	04.6	92	191.9	06.7	52	251.8	08.8
13	13.0	00.5	73	73.0	02.5	33	132.9	04.7	93	192.9	06.8	53	252.8	08.9
14	14.0	00.5	74	74.0	02.6	34	133.9	04.7	94	195.9	06.8	54	253.8	08.9
15	15.0	00.5	75	75.0	02.6	35	134.9	04.7	95	194.9	06.8	55	254.8	08.9
16	16.0	00.6	76	76.0	02.7	36	135.9	04.8	96	195.9	06.9	56	255.8	09.0
17	17.0	00.6	77	77.0	02.7	37	136.9	04.8	97	196.9	06.9	57	256.8	09.0
18	18.0	00.6	78	78.0	02.7	38	137.9	04.8	98	197.9	06.9	58	257.8	09.0
19	19.0	00.7	79	79.0	02.8	39	138.9	04.9	99	198.9	07.0	59	258.8	09.1
20	20.0	00.7	80	80.0	02.8	40	139.9	04.9	200	199.9	07.0	60	259.8	09.1
21	21.0	00.7	81	81.0	02.8	141	140.9	04.9	201	200.9	07.0	261	260.8	09.1
22	22.0	00.8	82	81.9	02.9	42	141.9	05.0	02	201.9	07.1	62	261.8	09.2
23	23.0	00.8	83	82.9	02.9	43	142.9	05.0	03	202.9	07.1	63	262.8	09.2
24	24.0	00.8	84	83.9	02.9	44	143.9	05.0	04	203.9	07.1	64	263.8	09.2
25	25.0	00.9	85	84.9	03.0	45	144.9	05.1	05	204.9	07.2	65	264.8	09.3
26	26.0	00.9	86	85.9	03.0	46	145.9	05.1	06	205.9	07.2	66	265.8	09.3
27	27.0	00.9	87	86.9	03.0	47	146.9	05.1	07	206.9	07.2	67	266.8	09.3
28	28.0	01.0	88	87.9	03.1	48	147.9	05.2	08	207.9	07.3	68	267.8	09.4
29	29.0	01.0	89	88.9	03.1	49	148.9	05.2	09	208.9	07.3	69	268.8	09.4
30	30.0	01.1	90	89.9	03.1	50	149.9	05.3	10	209.9	07.4	70	269.8	09.5
31	31.0	01.1	91	90.9	03.2	151	150.9	05.3	211	210.9	07.4	271	270.8	09.5
32	32.0	01.1	92	91.9	03.2	52	151.9	05.3	12	211.9	07.4	72	271.8	09.5
33	33.0	01.2	93	92.9	03.2	53	152.9	05.4	13	212.9	07.5	73	272.8	09.6
34	34.0	01.2	94	93.9	03.3	54	153.9	05.4	14	213.9	07.5	74	273.8	09.6
35	35.0	01.2	95	94.9	03.3	55	154.9	05.4	15	214.9	07.5	75	274.8	09.6
36	36.0	01.3	96	95.9	03.4	56	155.9	05.5	16	215.9	07.6	76	275.8	09.7
37	37.0	01.3	97	96.9	03.4	57	156.9	05.5	17	216.9	07.6	77	276.8	09.7
38	38.0	01.3	98	97.9	03.4	58	157.9	05.5	18	217.9	07.6	78	277.8	09.7
39	39.0	01.4	99	98.9	03.5	59	158.9	05.6	19	218.9	07.7	79	278.8	09.8
40	40.0	01.4	100	99.9	03.5	60	159.9	05.6	20	219.9	07.7	80	279.8	09.8
41	41.0	01.4	101	100.9	03.5	161	160.9	05.6	221	220.9	07.7	281	280.8	09.8
42	42.0	01.5	02	101.9	03.6	62	161.9	05.7	22	221.9	07.8	82	281.8	09.9
43	43.0	01.5	03	102.9	03.6	63	162.9	05.7	23	222.9	07.8	83	282.8	09.9
44	44.0	01.5	04	103.9	03.6	64	163.9	05.7	24	223.9	07.8	84	283.8	09.9
45	45.0	01.6	05	104.9	03.7	65	164.9	05.8	25	224.9	07.9	85	284.8	10.0
46	46.0	01.6	06	105.9	03.7	66	165.9	05.8	26	225.9	07.9	86	285.8	10.0
47	47.0	01.6	07	106.9	03.7	67	166.9	05.8	27	226.9	07.9	87	286.8	10.0
48	48.0	01.7	08	107.9	03.8	68	167.9	05.9	28	227.9	08.0	88	287.8	10.1
49	49.0	01.7	09	108.9	03.8	69	168.9	05.9	29	228.9	08.0	89	288.8	10.1
50	50.0	01.7	10	109.9	03.8	70	169.9	06.0	30	229.9	08.1	90	289.8	10.2
51	51.0	01.8	111	110.9	03.9	171	170.9	06.0	231	230.9	08.1	291	290.8	10.2
52	52.0	01.8	12	111.9	03.9	72	171.9	06.0	32	231.9	08.1	92	291.8	10.2
53	53.0	01.8	13	112.9	04.0	73	172.9	06.1	33	232.9	08.2	93	292.8	10.3
54	54.0	01.9	14	113.9	04.0	74	173.9	06.1	34	233.9	08.2	94	293.8	10.3
55	55.0	01.9	15	114.9	04.0	75	174.9	06.1	35	234.9	08.2	95	294.8	10.3
56	56.0	02.0	16	115.9	04.1	76	175.9	06.2	36	235.9	08.3	96	295.8	10.4
57	57.0	02.0	17	116.9	04.1	77	176.9	06.2	37	236.9	08.3	97	296.8	10.4
58	58.0	02.0	18	117.9	04.1	78	177.9	06.2	38	237.9	08.3	98	297.8	10.4
59	59.0	02.1	19	118.9	04.2	79	178.9	06.3	39	238.9	08.4	99	298.8	10.5
60	60.0	02.1	20	119.9	04.2	80	179.9	06.3	40	239.9	08.4	300	299.8	10.5
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 88 Deg.

Difference of Latitude and Departure for 3 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.1	61	60.9	03.2	121	120.8	06.3	181	180.7	09.5	241	240.7	12.6
2	02.0	00.1	62	61.9	03.2	22	121.8	06.4	82	181.7	09.5	42	241.7	12.7
3	03.0	00.2	63	62.9	03.3	23	122.8	06.4	83	182.7	09.6	43	242.7	12.7
4	04.0	00.2	64	63.9	03.3	24	123.8	06.5	84	183.7	09.6	44	243.7	12.8
5	05.0	00.3	65	64.9	03.4	25	124.8	06.5	85	184.7	09.7	45	244.7	12.8
6	06.0	00.3	66	65.9	03.5	26	125.8	06.6	86	185.7	09.7	46	245.7	12.9
7	07.0	00.4	67	66.9	03 5	27	126.8	06.6	87	186.7	09.8	47	246.7	12.9
8	08.0	00.4	68	67.9	03.6	28	127.8	06.7	88	187.7	09.8	48	247.7	13.0
9	09.0	00.5	69	68.9	03.6	29	128.8	06.8	89	188.7	09.9	49	248.7	13.0
10	10.0	00.5	70	69.9	03.7	30	129.8	06.8	90	189.7	09.9	50	249.7	13.1
11	11.0	00.6	71	70.9	03.7	131	130.8	06.9	191	190.7	10.0	251	240.6	13.1
12	12.0	00,6	72	71.9	03.8	32	131.8	06.9	92	191.7	10.0	52	251.6	13.2
13	13.0	00.7	73	72.9	03.8	33	132.8	07.0	93	192.7	10.1	53	252.6	13.2
14	14.0	00.7	74	73.9	03.9	34	133.8	07.0	94	193.7	10.1	54	253.6	13.3
15	15.0	00.8	75	74.9	03.9	35	134.8	07.1	95	194.7	10.2	55	254.6	13.3
16	16.0	00.8	76	75.9	04.0	36	135.8	07.1	96	195.7	10.3	56	255.6	13.4
17	17.0	00.9	77	76.9	04.0	37	136.8	07.2	67	196.7	10.3	57	256.6	13.4
18	18.0	00.9	78	77.9	04.1	38	137.8	07.2	98	197.7	10.4	58	257.6	13.5
19	19.0	01.0	79	78.9	04.1	39	138.8	07.3	99	198.7	10.4	59	258.6	13.6
20	20.0	01.0	80	79.9	04.2	40	139.8	07.3	200	199.7	10.5	60	259.6	13.6
21	21.0	01.1	81	80.9	04.2	141	140.8	07.4	201	200.7	10.5	261	260.6	13.7
22	22.0	01.1	82	81.9	04.3	42	141.8	07.4	02	201.7	10.6	62	261.6	13.7
23	23.0	01.2	83	82.9	04.3	43	142.8	07.5	03	202.7	10.6	63	262.6	13.8
24	24.0	01.3	84	83.9	04.4	44	143.8	07.5	04	203.7	10.7	64	263.6	13.8
25	25.0	01.3	85	84.9	04.4	45	144.8	07.6	05	204.7	10.7	65	264.6	13.9
26	26.0	01.4	86	85.9	04.5	46	145.8	07.6	06	205.7	10.8	66	265.6	13.9
27	27.0	01.4	87	86.9	04.6	47	146.8	07.7	07	206.7	10.8	67	266.6	14.0
28	28.0	01.5	88	87.9	04.6	48	147.8	07.7	08	207.7	10.9	68	267.6	14.0
29	29.0	01.5	89	88.9	04.7	49	148.8	07.8	09	208.7	10.9	69	268.6	14.1
30	30.0	01.6	90	89.9	04.7	50	149.8	07.9	10	209.7	11.0	70	269.6	14.1
31	31.0	01.6	91	90.9	04.8	151	150.8	07.9	211	210.7	11.0	271	270.6	14.2
32	32.0	01.7	92	91.9	04.8	52	151.8	08.0	12	211.7	11.1	72	271.6	14.2
33	33.0	01.7	93	92.9	04.9	53	152.8	08.0	13	212.7	11.1	73	272.6	14.3
34	34.0	01.8	94	93.9	04.9	54	153.8	08.1	14	213.7	11.2	74	273.6	14.3
35	35.0	01.8	95	94.9	05.0	55	154.8	08.1	15	214.7	11.2	75	274.6	14.4
36	35.9	01.9	96	95.9	05.0	56	155.8	08.2	16	215.7	11.3	76	275.6	14.4
37	36.9	01.9	97	96.9	05.1	57	156.8	08.2	17	216.7	11.4	77	276.6	14.5
38	37.9	02.0	98	97.9	05.1	58	157.8	08.3	18	217.7	11.4	78	277.6	14.5
39	38.9	02.0	99	98.9	05.2	59	158.8	08.3	19	218.7	11.5	79	278.6	14.6
40	39.9	02.1	100	99.9	05.2	60	159.8	08.4	20	219.7	11.5	80	279.6	14.7
41	40.9	02.1	101	100.9	05.3	161	160.8	08.4	221	220.7	11.6	281	280.6	14.7
42	41.9	02.2	02	101.9	05.3	62	161.8	08.5	22	221.7	11.6	82	281.6	14.8
43	42.9	02.2	03	102.9	05.4	63	162.8	08.5	23	222.7	11.7	83	282.6	14.8
44	43.9	02.3	04	103.9	05.4	64	163.8	08.6	24	223.7	11.7	84	283.6	14.9
45	44.9	02.4	05	104.9	05.5	65	164.8	08.6	25	224.7	11.8	85	284.6	14.9
46	45.9	02.4	06	105.9	05.5	66	165.8	08.7	26	225.7	11.8	86	285.6	15.0
47	46.9	02.5	07	106.9	05.6	67	166.8	08.7	27	226.7	11.9	87	286.6	15.0
48	47.9	02.5	08	107.8	05.7	68	167.8	08.8	28	227.7	11.9	88	287.6	15.1
49	48.9	02.6	09	108.8	05.7	69	168.8	08.8	29	228.7	12.0	89	288.6	15.1
50	49.9	02.6	10	109.8	05.8	70	169.8	08.9	30	229.7	12.0	90	289.6	15.2
51	50.9	02.7	111	110.8	05.8	171	170.8	09.0	231	230.7	12.1	291	290.6	15.2
52	51.9	02.7	12	111.8	05.9	72	171.8	09.0	32	231.7	12.1	92	291.6	15.3
53	52.9	02.8	13	112.8	05.9	73	172.8	09.1	33	232.7	12.2	93	292.6	15.3
54	53.9	02.8	14	113.8	06.0	74	173.8	09.1	34	233.7	12.2	94	293.6	15.4
55	54.9	02.9	15	114.8	06.0	75	174.8	09.2	35	234.7	12.3	95	294.6	15.4
56	55.9	02.9	16	115.8	06.1	76	175.8	09.2	36	235.7	12.3	96	295.6	15.5
57	56.9	03.0	17	116.8	06.1	77	176.8	09.3	37	236.7	12.4	97	296.6	15.5
58	57.9	03.0	18	117.8	06.2	78	177.8	09.3	38	237.7	12.5	98	297.6	15.6
59	58.9	03.1	19	118.8	06.2	79	178.8	09.4	39	238.7	12.5	99	298.6	15.6
60	59.9	03.1	20	119.8	06.3	80	179.8	09.4	40	239.7	12.6	300	299.6	15.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 87 Deg.

Difference of Latitude and Departure for 4 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.1	61	60.9	04.3	121	120.7	08.4	81	180.6	12.6	241	240.4	16.8
2	02.0	00.1	62	61.9	04.3	22	121.7	08.5	82	181.6	12.7	42	241.4	16.9
3	03.0	00.2	63	62.8	04.4	23	122.7	08.6	83	182.6	12.8	43	242.4	16.9
4	04.0	00.3	64	63.8	04.5	24	123.7	08.6	84	183.6	12.8	44	243.4	17.0
5	05.0	00.3	65	64.8	04.5	25	124.7	08.7	85	184.6	12.9	45	244.4	17.1
6	06.0	00.4	66	65.8	04.6	26	125.7	08.8	86	185.6	13.0	46	245.4	17.1
7	07.0	00.5	67	66.8	04.7	27	126.7	08.9	87	186.6	13.0	47	246.4	17.2
8	08.0	00.6	68	67.8	04.7	28	127.7	08.9	88	187.5	13.1	48	247.4	17.3
9	09.0	00.6	69	68.8	04.8	29	128.7	09.0	89	188.5	13.2	49	248.4	17.4
10	10.0	00.7	70	69.8	04.9	30	129.7	09.1	90	189.5	13.2	50	249.4	17.4
11	11.0	00.8	71	70.8	05.0	131	130.7	09.1	191	190.5	13.3	251	250.4	17.5
12	12.0	00.8	72	71.8	05.0	32	131.7	09.2	92	191.5	13.4	52	251.4	17.6
13	13.0	00.9	73	72.8	05.1	33	132.7	09.3	93	192.5	13.5	53	252.4	17.6
14	14.0	01.0	74	73.8	05.2	34	133.7	09.3	94	193.5	13.5	54	253.4	17.7
15	15.0	01.0	75	74.8	05.2	35	134.7	09.4	95	194.5	13.6	55	254.4	17.8
16	16.0	01.1	76	75.8	05.3	36	135.7	09.5	96	195.5	13.7	56	255.4	17.8
17	17.0	01.2	77	76.8	05.4	37	136.7	09.5	97	196.5	13.7	57	256.4	17.9
18	18.0	01.3	78	77.8	05.4	38	137.7	09.6	98	197.5	13.8	58	257.4	18.0
19	19.0	01.3	79	78.8	05.5	39	138.7	09.7	99	198.5	13.9	59	258.4	18.1
20	20.0	01.4	80	79.8	05.6	40	139.7	09.8	200	199.5	13.9	60	259.4	18.1
21	20.9	01.5	81	80.8	05.7	141	140.7	09.8	201	200.5	14.0	261	260.4	18.2
22	21.9	01.5	82	81.8	05.7	42	141.7	09.9	02	201.5	14.1	62	261.4	18.3
23	22.9	01.6	83	82.8	05.8	43	142.7	10.0	03	202.5	14.1	63	262.4	18.3
24	23.9	01.7	84	83.8	05.9	44	143.7	10.0	04	203.5	14.2	64	263.4	18.4
25	24.9	01.7	85	84.8	05.9	45	144.7	10.1	05	204.5	14.3	65	264.4	18.5
26	25.9	01.8	86	85.8	06.0	46	145.6	10.2	06	205.5	14.4	66	265.4	18.5
27	26.9	01.9	87	86.8	06.1	47	146.6	10.2	07	206.5	14.4	67	266.4	18.6
28	27.9	02.0	88	87.8	06.1	48	147.6	10.3	08	207.5	14.5	68	267.4	18.7
29	28.9	02.0	89	88.8	06.2	49	148.6	10.4	09	208.5	14.6	69	268.4	18.7
30	29.9	02.1	90	89.8	06.3	50	149.6	10.5	10	209.5	14.6	70	269.4	18.8
31	30.9	02.2	91	90.8	06.4	151	150.6	10.5	211	210.5	14.7	271	270.3	18.9
32	31.9	02.2	92	91.8	06.4	52	151.6	10.6	12	211.5	14.8	72	271.3	19.0
33	32.9	02.3	93	92.8	06.5	53	152.6	10.7	13	212.5	14.8	73	272.3	19.0
34	33.9	02.4	94	93.8	06.6	54	153.6	10.7	14	213.5	14.9	74	273.3	19.1
35	34.9	02.4	95	94.8	06.6	55	154.6	10.8	15	214.5	15.0	75	274.3	19.2
36	35.9	02.5	96	95.8	06.7	56	155.6	10.9	16	215.5	15.1	76	275.3	19.2
37	36.9	02.6	97	96.8	06.8	57	156.6	10.9	17	216.5	15.1	77	276.3	19.3
38	37.9	02.7	98	97.8	06.8	58	157.6	11.0	18	217.5	15.2	78	277.3	19.4
39	38.9	02.7	99	98.8	06.9	59	158.6	11.1	19	218.5	15.3	79	278.3	19.4
40	39.9	02.8	100	99.8	07.0	60	159.6	11.2	20	219.5	15.3	80	279.3	19.5
41	40.9	02.9	101	100.8	07.0	161	160.6	11.2	221	220.5	15.4	281	280.3	19.6
42	41.9	02.9	02	101.8	07.1	62	161.6	11.3	22	221.5	15.5	82	281.3	19.7
43	42.9	03.0	03	102.8	07.2	63	162.6	11.4	23	222.5	15.5	83	282.3	19.7
44	43.9	03.1	04	103.8	07.2	64	163.6	11.4	24	223.5	15.6	84	283.3	19.8
45	44.9	03.1	05	104.7	07.3	65	164.6	11.5	25	224.5	15.7	85	284.3	19.9
46	45.9	03.2	06	105.7	07.4	66	165.6	11.6	26	225.5	15.8	86	285.3	19.9
47	46.9	03.3	07	106.7	07.5	67	166.6	11.6	27	226.5	15.8	87	286.3	20.0
48	47.9	03.4	08	107.7	07.5	68	167.6	11.7	28	227.5	15.9	88	287.3	20.1
49	48.9	03.4	09	108.7	07.6	69	168.6	11.8	29	228.5	16.0	89	288.3	20.1
50	49.9	03.5	10	109.7	07.7	70	169.6	11.8	30	229.4	16.0	90	289.3	20.2
51	50.9	03.6	111	110.7	07.7	171	170.6	11.9	231	230.4	16.1	291	290.3	20.3
52	51.9	03.6	12	111.7	07.8	72	171.6	12.0	32	231.4	16.2	92	291.3	20.4
53	52.9	03.7	13	112.7	07.9	73	172.6	12.1	33	232.4	16.2	93	292.3	20.4
54	53.9	03.8	14	113.7	07.9	74	173.6	12.1	34	233.4	16.3	94	293.3	20.5
55	54.9	03.8	15	114.7	08.0	75	174.6	12.2	35	234.4	16.4	95	294.3	20.6
56	55.9	03.9	16	115.7	08.1	76	175.6	12.3	36	235.4	16.4	96	295.3	20.6
57	56.9	04.0	17	116.7	08.2	77	176.6	12.3	37	236.4	16.5	97	296.3	20.7
58	57.9	04.0	18	117.7	08.2	78	177.6	12.4	38	237.4	16.6	98	297.3	20.8
59	58.9	04.1	19	118.7	08.3	79	178.6	12.5	39	238.4	16.7	99	298.3	20.8
60	59.9	04.2	20	119.7	08.4	80	179.6	12.5	40	239.4	16.7	300	299.3	20.9
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 86 Deg.

Difference of Latitude and Departure for 5 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.1	61	60.8	05.3	121	120.5	10.5	181	180.3	15.7	241	240.1	21.0
2	02.0	00.2	62	61.8	05.4	22	121.5	10.6	82	181.3	15.8	42	241.1	21.1
3	03.0	00.3	63	62.8	05.5	23	122.5	10.7	83	182.3	15.9	43	242.1	21.1
4	04.0	00.3	64	63.8	05.6	24	123.5	10.8	84	183.3	16.0	44	243.1	21.2
5	05.0	00.4	65	64.8	05.7	25	124.5	10.9	85	184.3	16.1	45	244.1	21.3
6	06.0	00.5	66	65.7	05.8	26	125.5	11.0	86	185.3	16.2	46	245.1	21.4
7	07.0	00.6	67	66.7	05.8	27	126.5	11.0	87	186.3	16.3	47	246.1	21.5
8	08.0	00.7	68	67.7	05.9	28	127.5	11.1	88	187.3	16.4	48	247.1	21.6
9	09.0	00.8	69	68.7	06.0	29	128.5	11.2	89	188.3	16.4	49	248.1	21.7
10	10.0	00.9	70	69.7	06.1	30	129.5	11.3	90	189.3	16.5	50	249.1	21.8
11	11.0	01.0	71	70.7	06.2	131	130.5	11.4	191	190.3	16.6	251	250.0	21.8
12	12.0	01.0	72	71.7	06.3	32	131.5	11.5	92	191.3	16.7	52	251.0	21.9
13	12.9	01.1	73	72.7	06.4	33	132.5	11.6	93	192.3	16.8	53	252.0	22.0
14	13.9	01.2	74	73.7	06.5	34	133.5	11.7	94	193.3	16.9	54	253.0	22.1
15	14.9	01.3	75	74.7	06.5	35	134.5	11.7	95	194.3	17.0	55	254.0	22.2
16	15.9	01.4	76	75.7	06.6	36	135.5	11.8	96	195.3	17.1	56	255.0	22.3
17	16.9	01.5	77	76.7	06.7	37	136.5	11.9	97	196.3	17.1	57	256.0	22.4
18	17.9	01.6	78	77.7	06.8	38	137.5	12.0	98	197.2	17.2	58	257.0	22.4
19	18.9	01.7	79	78.7	06.9	39	138.5	12.1	99	198.2	17.3	59	258.0	22.5
20	19.9	01.7	80	79.7	07.0	40	139.5	12.2	200	199.2	17.4	60	259.0	22.6
21	20.9	01.8	81	80.7	07.1	141	140.5	12.3	201	200.2	17.5	261	260.0	22.7
22	21.9	01.9	82	81.7	07.2	42	141.5	12.4	02	201.2	17.6	62	261.0	22.8
23	22.9	02.0	83	82.7	07.2	43	142.5	12.4	03	202.2	17.7	63	262.0	22.9
24	23.9	02.1	84	83.7	07.3	44	143.5	12.5	04	203.2	17.7	64	263.0	23.0
25	24.9	02.2	85	84.7	07.4	45	144.4	12.6	05	204.2	17.8	65	264.0	23.1
26	25.9	02.3	86	85.7	07.5	46	145.4	12.7	06	205.2	17.9	66	265.0	23.1
27	26.9	02.4	87	86.7	07.6	47	146.4	12.8	07	206.2	18.0	67	266.0	23.2
28	27.9	02.4	88	87.7	07.7	48	147.4	12.9	08	207.2	18.1	68	267.0	23.3
29	28.9	02.5	89	88.7	07.8	49	148.4	13.0	09	208.2	18.2	69	268.0	23.4
30	29.9	02.6	90	89.7	07.8	50	149.4	13.1	10	209.2	18.3	70	269.0	23.5
31	30.9	02.7	91	90.7	07.9	151	150.4	13.1	211	210.2	18.4	271	270.0	23.6
32	31.9	02.8	92	91.6	08.0	52	151.4	13.2	12	211.2	18.4	72	271.0	23.7
33	32.9	02.9	93	92.6	08.1	53	152.4	13.3	13	212.2	18.5	73	272.0	23.8
34	33.9	03.0	94	93.6	08.2	54	153.4	13.4	14	213.2	18.6	74	273.0	23.8
35	34.9	03.1	95	94.6	08.3	55	154.4	13.5	15	214.2	18.7	75	274.0	23.9
36	35.9	03.1	96	95.6	08.4	56	155.4	13.6	16	215.2	18.8	76	275.0	24.0
37	36.9	03.2	97	96.6	08.5	57	156.4	13.7	17	216.2	18.9	77	275.9	24.1
38	37.9	03.3	98	97.6	08.5	58	157.4	13.7	18	217.2	19.0	78	276.9	24.2
39	38.9	03.4	99	98.6	08.6	59	158.4	13.8	19	218.2	19.1	79	277.9	24.3
40	39.8	03.5	100	99.6	08.7	60	159.4	13.9	20	219.2	19.1	80	278.9	24.4
41	40.8	03.6	101	100.6	08.8	161	160.4	14.0	221	220.2	19.2	181	279.9	24.4
42	41.8	03.7	02	101.6	08.9	62	161.4	14.1	22	221.2	19.3	82	280.9	24.5
43	42.8	03.8	03	102.6	09.0	63	162.4	14.2	23	222.2	19.4	83	281.9	24.6
44	43.8	03.8	04	103.6	09.0	64	163.4	14.3	24	223.1	19.5	84	282.9	24.7
45	44.8	03.9	05	104.6	09.1	65	164.4	14.4	25	224.1	19.6	85	283.9	24.8
46	45.8	04.0	06	105.6	09.2	66	165.4	14.4	26	225.1	19.7	86	284.9	24.9
47	46.8	04.1	07	106.6	09.3	67	166.4	14.5	27	226.1	19.7	87	285.9	25.0
48	47.8	04.2	08	107.6	09.4	68	167.4	14.6	28	227.1	19.8	88	286.9	25.1
49	48.8	04.3	09	108.6	09.5	69	168.4	14.7	29	228.1	19.9	89	287.9	25.1
50	49.8	04.4	10	109.6	09.6	70	169.4	14.8	30	229.1	20.0	90	288.9	25.2
51	50.8	04.4	111	110.6	10.7	171	170.4	14.9	231	230.1	20.1	291	289.9	25.3
52	51.8	04.5	12	111.6	10.7	72	171.3	15.0	32	231.1	20.2	92	290.9	25.4
53	52.8	04.6	13	112.6	10.8	73	172.3	15.1	33	232.1	20.3	93	291.9	25.5
54	53.8	04.7	14	113.6	10.9	74	173.3	15.1	34	233.1	20.4	94	292.9	25.6
55	54.8	04.8	15	114.6	10.0	75	174.3	15.2	35	234.1	20.4	95	293.9	25.7
56	55.8	04.9	16	115.6	10.1	76	175.3	15.3	36	235.1	20.5	96	294.9	25.8
57	56.8	05.0	17	116.6	10.2	77	176.3	15.4	37	236.1	20.6	97	295.9	25.8
58	57.8	05.1	18	117.6	10.3	78	177.3	15.5	38	237.1	20.7	98	296.9	25.9
59	58.8	05.1	19	118.5	10.4	79	178.3	15.6	39	238.1	20.8	99	297.9	26.0
60	59.8	05.2	20	119.5	10.4	80	179.3	15.7	40	239.1	20.9	300	298.9	26.1
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 85 Deg.

Difference of Latitude and Departure for 6 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.1	61	60.7	06.4	121	120.3	12.6	181	180.0	18.9	241	239.7	25.2
2	02.0	00.2	62	61.7	06.5	22	121.3	12.7	82	181.0	19.0	42	240.7	25.3
3	03.0	00.3	63	62.7	06.6	23	122.3	12.9	83	182.0	19.1	43	241.7	25.4
4	04.0	00.4	64	63.6	06.7	24	123.3	13.0	84	183.0	19.2	44	242.7	25.5
5	05.0	00.5	65	64.6	06.8	25	124.3	13.1	85	184.0	19.3	45	243.7	25.6
6	06.0	00.6	66	65.6	06.9	26	125.3	13.2	86	185.0	19.4	46	244.6	25.7
7	07.0	00.7	67	66.6	07.0	27	126.3	13.3	87	186.0	19.5	47	245.6	25.8
8	08.0	00.8	68	67.6	07.1	28	127.3	13.4	88	187.0	19.6	48	246.6	25.9
9	08.9	00.9	69	68.6	07.2	29	128.3	13.5	89	188.0	19.8	49	247.6	26.0
10	09.9	01.0	70	69.6	07.3	30	129.3	13.6	90	189.0	19.9	50	248.6	26.1
11	10.9	01.1	71	70.6	07.4	131	130.3	13.7	191	189.9	20.0	251	249.6	26.2
12	11.9	01.3	72	71.6	07.5	32	131.3	13.8	92	190.9	20.1	52	250.6	26.3
13	12.9	01.4	73	72.6	07.6	33	132.3	13.9	93	191.9	20.2	53	251.6	26.4
14	13.9	01.5	74	73.6	07.7	34	133.3	14.0	94	192.9	20.3	54	252.6	26.5
15	14.9	01.6	75	74.6	07.8	35	134.3	14.1	95	193.9	20.4	55	253.6	26.6
16	15.9	01.7	76	75.6	07.9	36	135.3	14.2	96	194.9	20.5	56	254.6	26.8
17	16.9	01.8	77	76.6	08.0	37	136.2	14.3	97	195.9	20.6	57	255.6	26.9
18	17.9	01.9	78	77.6	08.1	38	137.2	14.4	98	196.9	20.7	58	256.6	27.0
19	18.9	02.0	79	78.6	08.3	39	138.2	14.5	99	197.9	20.8	59	257.6	27.1
20	19.9	02.1	80	79.6	08.4	40	139.2	14.6	200	198.9	20.9	60	258.6	27.2
21	20.9	02.2	81	80.6	08.5	141	140.2	14.7	201	199.9	21.0	261	259.6	27.3
22	21.9	02.3	82	81.5	08.6	42	141.2	14.8	02	200.9	21.1	62	260.6	27.4
23	22.9	02.4	83	82.5	08.7	43	142.2	14.9	03	201.9	21.2	63	261.6	27.5
24	23.9	02.5	84	83.5	08.8	44	143.2	15.0	04	202.9	21.3	64	262.5	27.6
25	24.9	02.6	85	84.5	08.9	45	144.2	15.2	05	203.9	21.4	65	263.5	27.7
26	25.9	02.7	86	85.5	09.0	46	145.2	15.3	06	204.9	21.5	66	264.5	27.8
27	26.9	02.8	87	86.5	09.1	47	146.2	15.4	07	205.9	21.6	67	265.5	27.9
28	27.8	02.9	88	87.5	09.2	48	147.2	15.5	08	206.9	21.7	68	266.5	28.0
29	28.8	03.0	89	88.5	09.3	49	148.2	15.6	09	207.9	21.8	69	267.5	28.1
30	29.8	03.1	90	89.5	09.4	50	149.2	15.7	10	208.8	21.9	70	268.5	28.2
31	30.8	03.2	91	90.5	09.5	151	150.2	15.8	211	209.8	22.0	271	269.5	28.3
32	31.8	03.3	92	91.5	09.6	52	151.2	15.9	12	210.8	22.2	72	270.5	28.4
33	32.8	03.4	93	92.5	09.7	53	152.2	16.0	13	211.8	22,3	73	271.5	28.5
34	33.8	03.6	94	93.5	09.8	54	153.2	16.1	14	212.8	22.4	74	272.5	28.6
35	34.8	03.7	95	94.5	09.9	55	154.1	16.2	15	213.8	22.5	75	273.5	28.7
36	35.8	03.8	96	95.5	10.0	56	155.1	16.3	17	214.8	22.6	76	274.5	28.8
37	36.8	03.9	97	96.5	10.1	57	156.1	16.4	16	215.8	22.7	77	275.1	28.9
38	37.8	04.0	98	97.5	10.2	58	157.1	16.5	18	216.8	22.8	78	276.5	29.1
39	38.8	04.1	99	98.5	10.3	59	158.1	16.6	19	217.8	22.9	79	277.5	29.2
40	39.8	04.2	100	99.5	10.5	60	159.1	16.7	20	218.8	23.0	80	278.5	29.3
41	40.8	04.3	101	100.4	10.6	161	160.1	16.8	221	219.8	23.1	281	279.5	29.4
42	41.8	04.4	02	101.4	10.7	62	161.1	16.9	22	220.8	23.2	82	280.4	29.5
43	42.8	04.5	03	102.4	10.8	63	162.1	17.0	23	221.8	23.3	83	281.4	29.6
44	43.8	04.6	04	103.4	10.9	64	163.1	17.1	24	222.8	23.4	84	282.4	29.7
45	44.8	04.7	05	104.4	11.0	65	164.1	17.2	25	223.8	23.5	85	283.4	29.8
46	45.7	04.8	06	105.4	11.1	66	165.1	17.3	26	224.8	23.6	86	284.4	29.9
47	46.7	04.9	07	106.4	11.2	67	166.1	17.5	27	225.8	23.7	87	285.4	30.0
48	47.7	05.0	08	107.4	11.3	68	167.1	17.6	28	226.7	23.8	88	286.4	30.1
49	48.7	05.1	09	108.4	11.4	69	168.1	17.7	29	227.7	23.9	89	287.4	30.2
50	49.7	05.2	10	109.4	11.5	70	169.1	17.8	30	228.7	24.0	90	288.4	30.3
51	50.7	05.3	111	110.4	11.6	171	170.1	17.9	231	229.7	24.1	291	289.4	30.4
52	51.7	05.4	12	111.4	11.7	72	171.1	18.0	32	230.7	24.2	92	290.4	30.5
53	52.7	05.5	13	112.4	11.8	73	172.0	18.1	33	231.7	24.3	93	291.4	30.6
54	53.7	05.6	14	113.4	11.9	74	173.0	18.2	34	232.7	24.5	94	292.4	30.7
55	54.7	05.7	15	114.4	12.0	75	174.0	18.3	35	233.7	24.6	95	293.4	30.8
56	55.7	05.9	16	115.4	12.1	76	175.0	18.4	36	234.7	24.7	96	294.4	30.9
57	56.7	06.0	17	116.4	12.2	77	176.0	18.5	37	235.7	24.8	97	295.4	31.0
58	57.7	06.1	18	117.4	12.3	78	177.0	18.6	38	236.7	24.9	98	296.4	31.1
59	58.7	06.2	19	118.3	12.4	79	178.0	18.7	39	237.7	25.0	99	297.4	31.2
60	59.7	06.3	20	119.3	12.5	80	179.0	18.8	40	238.7	25.1	300	298.4	31.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 84 Deg.

Difference of Latitude and Departure for 7 Degrees.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.1	61	60.5	07.4	121	120.1	14.7	181	179.6	22.[illegible]	241	239.2	29.3
2	02.0	00.2	62	61.5	07.5	22	121.1	14.9	82	180.6	22.2	42	240.2	29.5
3	03.0	00.4	63	62.5	07.7	23	122.1	15.0	83	181.6	22.3	43	241.2	29.6
4	04.0	00.5	64	63.5	07.8	24	123.1	15.1	84	182.6	22.4	44	242.2	29.7
5	05.0	00.6	65	64.5	07.9	25	124.1	15.2	85	183.6	22.5	45	243.2	29.8
6	06.0	00.7	66	65.5	08.0	26	125.1	15.3	86	184.6	22.7	46	244.1	29.9
7	06.9	00.9	67	66.5	08.2	27	126.0	15.5	87	185.6	22.8	47	245.1	30.1
8	07.9	01.0	68	67.5	08.3	28	127.0	15.6	88	186.6	22.9	48	246.1	30.2
9	08.9	01.1	69	68.5	08.4	29	128.0	15.7	89	187.6	23.0	49	247.1	30.3
10	09.9	01.2	70	69.5	08.5	30	129.0	15.8	90	188.6	23.1	50	248.1	30.4
11	10.9	01.3	71	70.5	08.6	131	130.0	16.0	191	189.6	23.3	251	249.1	30.6
12	11.9	01.5	72	71.5	08.8	32	131.0	16.1	92	190.6	23.4	52	250.1	30.7
13	12.9	01.6	73	72.5	08.9	33	132.0	16.2	93	191.6	23.5	53	251.1	30.8
14	13.9	01.7	74	73.4	09.0	34	133.0	16.3	94	192.5	23.6	54	252.1	30.9
15	14.9	01.8	75	74.4	09.1	35	134.0	16.4	95	193.5	23.7	55	253.1	31.0
16	15.9	01.9	76	75.4	09.3	36	135.0	16.6	96	194.5	23.9	56	254.1	31.2
17	16.9	02.1	77	76.4	09.4	37	136.0	16.7	97	195.5	24.0	57	255.1	31.3
18	17.9	02.2	78	77.4	09.5	38	137.0	16.8	98	196.5	24.1	58	256.1	31.4
19	18.9	02.3	79	78.4	09.6	39	138.0	16.9	99	197.5	24.2	59	257.1	31.5
20	19.9	02.4	80	79.4	09.7	40	139.0	17.1	200	198.5	24.4	60	258.1	31.7
21	20.8	02.6	81	80.4	09.9	141	139.9	17.2	201	199.5	24.5	261	259.0	31.8
22	21.8	02.7	82	81.4	10.0	42	140.9	17.3	02	200.5	24.6	62	260.0	31.9
23	22.8	02.8	83	82.4	10.1	43	141.9	17.4	03	201.5	24.7	63	261.0	32.0
24	23.8	02.9	84	83.4	10.2	44	142.9	17.5	04	202.5	24.8	64	262.0	32.1
25	24.8	03.0	85	84.4	10.4	45	143.9	17.7	05	203.5	25.0	65	263.0	32.3
26	25.8	03.2	86	85.4	10.5	46	144.9	17.8	06	204.5	25.1	66	264.0	32.4
27	26.8	03.3	87	86.3	10.6	47	145.9	17.9	07	205.4	25.2	67	265.0	32.5
28	27.8	03.4	88	87.3	10.7	48	146.9	18.0	08	206.4	25.3	68	266.0	32.6
29	28.8	03.5	89	88.3	10.8	49	147.9	18.1	09	207.4	25.4	69	267.0	32.8
30	29.8	03.7	90	89.3	11.0	50	148.9	18.3	10	208.4	25.6	70	268.0	32.9
31	30.8	03.8	91	90.3	11.1	151	149.9	18.4	211	209.4	25.7	271	269.0	33.0
32	31.8	03.9	92	91.3	11.2	52	150.9	18.5	12	210.4	25.8	72	270.0	33.1
33	32.8	04.0	93	92.3	11.3	53	151.9	18.6	13	211.4	25.9	73	271.0	33.2
34	33.7	04.1	94	93.3	11.5	54	152.8	18.7	14	212.4	26.1	74	271.9	33.4
35	34.7	04.3	95	94.3	11.6	55	153.8	18.9	15	213.4	26.2	75	272.9	33.5
36	35.7	04.4	96	95.3	11.7	56	154.8	19.0	16	214.4	26.3	76	273.9	33.6
37	36.7	04.5	97	96.3	11.8	57	155.8	19.1	17	215.4	26.4	77	274.9	33.7
38	37.7	04.6	98	97.3	11.9	58	156.8	19.2	18	216.4	26.5	78	275.9	33.9
39	38.7	04.8	99	98.3	12.1	59	157.8	19.4	19	217.4	26.7	79	276.9	34.0
40	39.7	04.9	100	99.3	12.2	60	158.8	19.5	20	218.4	26.8	80	277.9	34.1
41	40.7	05.0	101	100.2	12.3	161	159.8	19.6	221	219.3	26.9	281	278.9	34.2
42	41.7	05.1	02	101.2	12.4	62	160.8	19.7	22	220.3	27.0	82	279.9	34.3
43	42.7	05.2	03	102.2	12.5	63	161.8	19.8	23	221.3	27.2	83	280.9	34.5
44	43.7	05.4	04	103.2	12.7	64	162.8	20.0	24	222.3	27.3	84	281.9	34.6
45	44.7	05.5	05	104.2	12.8	65	163.8	20.1	25	223.3	27.4	85	282.9	34.7
46	45.7	05.6	06	105.2	12.9	66	164.8	20.2	26	224.3	27.5	86	283.9	34.8
47	46.6	05.7	07	106.2	13.0	67	165.7	20.3	27	225.3	27.6	87	284.8	34.9
48	47.6	05.8	08	107.2	13.1	68	166.7	20.5	28	226.3	27.8	88	285.8	35.1
49	48.6	06.0	09	108.2	13.3	69	167.7	20.6	29	227.3	27.9	89	286.8	35.2
50	49.6	06.1	10	109.2	13.4	70	168.7	20.7	30	228.3	28.0	90	287.8	35.3
51	50.6	06.2	111	110.2	13.5	171	169.7	20.8	231	229.3	28.1	291	288.8	35.4
52	51.6	06.3	12	111.2	13.6	72	170.7	20.9	32	230.3	28.3	92	289.8	35.5
53	52.6	06.5	13	112.2	13.8	73	171.7	21.1	33	231.3	28.4	93	290.8	35.7
54	53.6	06.6	14	113.1	13.9	74	172.7	21.2	34	232.2	28.5	94	291.8	35.8
55	54.6	06.7	15	114.1	14.0	75	173.7	21.3	35	233.2	28.6	95	292.8	35.9
56	55.6	06.8	16	115.1	14.1	76	174.7	21.4	36	234.2	28.7	96	293.8	36.0
57	56.6	06.9	17	116.1	14.2	77	175.7	21.6	37	235.2	28.9	97	294.8	36.2
58	57.6	07.1	18	117.1	14.4	78	176.7	21.7	38	236.2	29.0	98	295.8	36.3
59	58.6	07.2	19	118.1	14.5	79	177.7	21.8	39	237.2	29.1	99	296.8	36.4
60	59.6	07.3	20	119.1	14.6	80	178.7	21.9	40	238.2	29.2	300	297.8	36.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 83 Deg.

Difference of Latitude and Departure for 8 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.1	61	60.4	08.5	121	119.8	16.8	181	179.2	25.2	241	238.7	33.5
2	02.0	00.3	62	61.4	08.6	22	120 8	17.0	82	180.2	25.3	42	239.7	33.7
3	03.0	00.4	63	62.4	08.8	23	121.8	17.1	83	181.2	25.5	43	240.6	33.8
4	04.0	00.6	64	63.4	08.9	24	122.8	17.3	84	182.2	25.6	44	241.6	34.0
5	05.0	00.7	65	64.4	09.0	25	123.8	17.4	85	183.2	25.8	45	242.6	34.1
6	05.9	00.8	66	65.4	09.2	26	124.8	17.5	86	184.2	25.9	46	243.6	34.2
7	06.9	01.0	67	66.4	09.3	27	125.8	17.7	87	185.2	26.0	47	244.6	34.4
8	07.9	01.1	68	67.3	09.5	28	126.8	17 8	88	186.2	26.2	48	245.6	34.5
9	08.9	01.3	69	68.3	09.6	29	127.7	18.0	89	187.2	26.3	49	246.6	34.7
10	09.9	01.4	70	69.3	09.7	30	128.7	18.1	90	188.2	26.4	50	247.6	34.8
11	10.9	01.5	71	70.3	09.9	131	129.7	18.2	191	189.1	26.6	251	248.6	34.9
12	11.9	01.7	72	71.3	10.0	32	130.7	18.4	92	190.1	26.7	52	249.6	35.1
13	12.9	01.8	73	72.3	10.2	33	131.7	18.5	93	191.1	26.9	53	250.5	35.2
14	13.9	01.9	74	73.3	10.3	34	132.7	18.7	94	192.1	27.0	54	251.5	35.4
15	14.9	02.1	75	74.3	10.4	35	133.7	18.8	95	193.1	27.1	55	252.5	35.5
16	15.8	02.2	76	75.3	10.6	36	134.7	18.9	96	194.1	27.3	56	253.5	35.6
17	16.8	02.4	77	76.3	10.7	37	135.7	19.1	97	195.1	27.4	57	254.5	35.8
18	17.8	02.5	78	77.2	10.9	38	136.7	19.2	98	196.1	27.6	58	255.5	35.9
19	18.8	02.6	79	78.2	11.0	39	137.7	19.3	99	197.1	27.7	59	256.5	36.1
20	19.8	02.8	80	79.2	11.1	40	138.6	19.5	200	198.1	27.8	60	257.5	36.2
21	20.8	02.9	81	80.2	11.3	141	139.6	19.6	201	199.0	28.0	261	258.5	36.3
22	21.8	03.1	82	81.2	11.4	42	140.6	19.8	02	200.0	28.1	62	259.5	36.5
23	22.8	03.2	83	82.2	11.6	43	141.6	19.9	03	201.0	28.3	63	260.4	36.6
24	23.8	03.3	84	83.2	11.7	44	142.6	20.0	04	202.0	28.4	64	261.4	36.7
25	24.8	03.5	85	84.2	11.8	45	143.6	20.2	05	203.0	28.5	65	262.4	36.9
26	25.7	03.6	86	85.2	12.0	46	144.6	20.3	06	204.0	28.7	66	263.4	37.0
27	26.7	03.8	87	86.2	12.1	47	145.6	20.5	07	205.0	28.8	67	264.4	37.2
28	27.7	03.9	88	87.1	12.2	48	146.6	20.6	08	206.0	29 0	68	265.4	37.3
29	28.7	04.0	89	88.1	12.4	49	147.6	20.7	09	207.0	29.1	69	266.4	37.4
30	29.7	04.2	90	89.1	12.5	50	148.5	20.9	10	208.0	29.2	70	267.4	37.6
31	30.7	04.3	91	90.1	12.7	151	149.5	21.0	211	209.0	29.4	271	268.4	37.7
32	31.7	04.5	92	91.1	12.8	52	150.5	21.2	12	209.9	29.5	72	269.4	37.9
33	32.7	04.6	93	92.1	12.9	53	151.5	21.3	13	210.9	29.6	73	270.4	38.0
34	33.7	04.7	94	93.1	13.1	54	152.5	21.4	14	211.9	29.8	74	271.3	38.1
35	34.7	04.9	95	94.1	13.2	55	153.5	21.6	15	212.9	29.9	75	272.3	38.3
36	35.7	05.0	96	95.1	13.4	56	154.5	21.7	16	213.9	30.1	76	273.3	38.4
37	36.6	05.2	97	96.1	13.5	57	155.5	21.9	17	214.9	30.2	77	274.3	38.6
38	37.6	05.4	98	97.0	13.6	58	156.5	22.0	18	215.9	30.3	78	275.3	38.7
39	38.6	05.5	99	98.0	13.8	59	157.5	22.1	19	216.9	30.5	79	276.3	38.8
40	39.6	05.6	100	99.0	13.9	60	158 4	22.3	20	217.9	30.6	80	277.3	39.0
41	40.6	05.7	101	100.0	14.1	161	159.4	22.4	221	218.9	30.8	281	278.3	39.1
42	41.6	05.8	02	101.0	14.2	62	160.4	22.6	22	219.8	30.9	82	279.3	39.3
43	42.6	06.0	03	102.0	14.3	63	161.4	22.7	23	220.8	31.0	83	280.3	39.4
44	43.6	06.1	04	103.0	14.5	64	162.4	22.8	24	221.8	31.2	84	281.2	39.5
45	44.6	06.3	05	104.0	14.6	65	163.4	23.0	25	222.8	31.3	85	282.2	39.7
46	45.6	06.4	06	105.0	14.8	66	164.4	23.1	26	223.8	31.5	86	283.2	39.8
47	46.5	06.5	07	106.0	14.9	67	165.4	23.2	27	224.8	31.6	87	284.2	40.0
48	47.5	06.7	08	107.0	15.0	68	166.4	23.4	28	225.8	31.7	88	285.2	40.1
49	48.5	06.8	09	107.9	15.2	69	167.4	23.5	29	226.8	31.9	89	286.2	40.2
50	49.5	07.0	10	108.9	15.3	70	168.4	23.7	30	227.8	32.0	90	287.2	40.4
51	50.5	07.1	111	109.9	15.5	171	169.3	23.8	231	228.8	32.2	291	288.2	40.5
52	51.5	07.2	12	110.9	15.6	72	170.3	23.9	32	229.7	32.3	92	289.2	40.6
53	52.5	07.4	13	111.9	15.7	73	171.3	24.1	33	230.7	32.4	93	290.2	40.8
54	53.5	07.5	14	112.9	15.9	74	172.3	24.2	34	231.7	32.6	94	291.1	40.9
55	54.5	07.7	15	113.9	16 0	75	173.3	24.4	35	232.7	32.7	95	292.1	41.1
56	55.5	07.8	16	114.9	16.1	76	174.3	24.5	36	233.7	32.9	96	293.1	41.2
57	56.4	07.9	17	115.9	16.3	77	175.3	24.6	37	234.7	33.0	97	294.1	41.3
58	57.4	08.1	18	116.9	16.4	78	176.3	24.7	38	235.7	33.1	98	295.1	41.5
59	58.4	08.2	19	117.8	16.6	79	177.3	24.9	39	236.7	33.3	99	296.1	41.6
60	59.4	08.4	20	118.8	16.7	80	178.3	25.1	40	237.7	33.4	300	297.1	41.8
Diſt	Dep	Dep	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 82 Deg.

Difference of Latitude and Departure for 9 Degrees.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.2	61	60.2	09.5	121	119.5	18.9	181	178.8	28.3	241	238.0	37.7
2	02.0	00.3	62	61.2	09.7	22	120.5	19.1	82	179.8	28.5	42	239.0	37.8
3	03.0	00.5	63	62.2	09.9	23	121.5	19.2	83	180.7	28.6	43	240.0	38.0
4	04.0	00.6	64	63.2	10.0	24	122.5	19.4	84	181.7	28.8	44	241.0	38.2
5	04.9	00.8	65	64.2	10.2	25	123.5	19.6	85	182.7	28.9	45	242.0	38.3
6	05.9	00.9	66	65.2	10.3	26	124.5	19.7	86	183.7	29.1	46	243.0	38.5
7	06.9	01.1	67	66.2	10.5	27	125.4	19.9	87	184.7	29.2	47	244.0	38.6
8	07.9	01.3	68	67.2	10.6	28	126.4	20.0	88	185.7	29.4	48	244.9	38.8
9	08.9	01.4	69	68.2	10.8	29	127.4	20.2	89	186.7	29.6	49	245.9	38.9
10	09.9	01.6	70	69.1	10.9	30	128.4	20.3	90	187.7	29.7	50	246.9	39.1
11	10.9	01.7	71	70.1	11.1	131	129.4	20.5	191	188.7	29.9	251	247.9	39.3
12	11.9	01.9	72	71.1	11.3	32	130.4	20.6	92	189.6	30.0	52	248.9	39.4
13	12.9	02.0	73	72.1	11.4	33	131.4	20.8	93	190.6	30.2	53	249.9	39.6
14	13.8	02.2	74	73.1	11.6	34	132.4	21.0	94	191.6	30.3	54	250.9	39.7
15	14.8	02.3	75	74.1	11.7	35	133.3	21.1	95	192.6	30.5	55	251.9	39.9
16	15.8	02.5	76	75.1	11.9	36	134.3	21.3	96	193.6	30.7	56	252.9	40.0
17	16.8	02.7	77	76.1	12.0	37	135.3	21.4	97	194.6	30.8	57	253.8	40.2
18	17.8	02.8	78	77.0	12.2	38	136.3	21.6	98	195.6	31.0	58	254.8	40.4
19	18.8	03.0	79	78.0	12.4	39	137.3	21.7	99	196.6	31.1	59	255.8	40.5
20	19.8	03.1	80	79.0	12.5	40	138.3	21.9	200	197.5	31.3	60	256.8	40.7
21	20.7	03.3	81	80.0	12.7	141	139.3	22.1	201	198.5	31.4	261	257.8	40.8
22	21.7	03.4	82	81.0	12.8	42	140.3	22.2	02	199.5	31.6	62	258.8	41.0
23	22.7	03.6	83	82.0	13.0	43	141.2	22.4	03	200.5	31.7	63	259.8	41.1
24	23.7	03.8	84	83.0	13.1	44	142.2	22.5	04	201.5	31.9	64	260.8	41.3
25	24.7	03.9	85	84.0	13.3	45	143.2	22.7	05	202.5	32.1	65	261.7	41.4
26	25.7	04.1	86	84.9	13.5	46	144.2	22.8	06	203.5	32.2	66	262.7	41.6
27	26.7	04.2	87	85.9	13.6	47	145.2	23.0	07	204.5	32.4	67	263.7	41.8
28	27.7	04.4	88	86.9	13.8	48	146.2	23.1	08	205.4	32.5	68	264.7	41.9
29	28.6	04.5	89	87.9	13.9	49	147.2	23.3	09	206.4	32.7	69	265.7	42.1
30	29.6	04.7	90	88.9	14.1	50	148.2	23.5	10	207.4	32.8	70	266.7	42.2
31	30.6	04.8	91	89.9	14.2	151	149.1	23.6	211	208.4	33.0	271	267.7	42.4
32	31.6	05.0	92	90.9	14.4	52	150.1	23.8	12	209.4	33.2	72	268.7	42.5
33	32.6	05.2	93	91.9	14.5	53	151.1	23.9	13	210.4	33.3	73	269.6	42.7
34	33.6	05.3	94	92.8	14.7	54	152.1	24.1	14	211.4	33.5	74	270.6	42.9
35	34.6	05.5	95	93.8	14.9	55	153.1	24.2	15	212.4	33.6	75	271.6	43.0
36	35.6	05.6	96	94.8	15.0	56	154.1	24.4	16	213.3	33.8	76	272.6	43.2
37	36.5	05.8	97	95.8	15.2	57	155.1	24.6	17	214.3	33.9	77	273.6	43.3
38	37.5	05.9	98	96.8	15.3	58	156.1	24.7	18	215.3	34.1	78	274.6	43.5
39	38.5	06.1	99	97.8	15.5	59	157.0	24.9	19	216.3	34.3	79	275.6	43.6
40	39.5	06.3	100	98.8	15.6	60	158.0	25.0	20	217.3	34.4	80	276.6	43.8
41	40.5	06.4	101	99.8	15.8	161	159.0	25.2	221	218.3	34.6	281	277.5	43.9
42	41.5	06.6	02	100.7	16.0	62	160.0	25.3	22	219.3	34.7	82	278.5	44.1
43	42.5	06.7	03	101.7	16.1	63	161.0	25.5	23	220.3	34.9	83	279.5	44.3
44	43.5	06.9	04	102.7	16.3	64	162.0	25.6	24	221.2	35.0	84	280.5	44.4
45	44.4	07.0	05	103.7	16.4	65	163.0	25.8	25	222.2	35.2	85	281.5	44.6
46	45.4	07.2	06	104.7	16.6	66	164.0	26.0	26	223.2	35.3	86	282.5	44.7
47	46.4	07.4	07	105.7	16.7	67	164.9	26.1	27	224.2	35.5	87	283.5	44.9
48	47.4	07.5	08	106.7	16.9	68	165.9	26.3	28	225.2	35.7	88	284.5	45.0
49	48.4	07.7	09	107.7	17.0	69	166.9	26.4	29	226.2	35.8	89	285.4	45.2
50	49.4	07.8	10	108.7	17.2	70	167.9	26.6	30	227.2	36.0	90	286.4	45.4
51	50.4	08.0	111	109.6	17.4	171	168.9	26.7	231	228.2	36.1	291	287.4	45.5
52	51.4	08.1	12	110.6	17.5	72	169.9	26.9	32	229.1	36.3	92	288.4	45.7
53	52.3	08.3	13	111.6	17.7	73	170.9	27.1	33	230.1	36.4	93	289.4	45.8
54	53.3	08.4	14	112.6	17.8	74	171.9	27.2	34	231.1	36.6	94	290.4	46.0
55	54.3	08.6	15	113.6	18.0	75	172.8	27.4	35	232.1	36.8	95	291.4	46.1
56	55.3	08.8	16	114.6	18.1	76	173.8	27.5	36	233.1	36.9	96	292.4	46.3
57	56.3	08.9	17	115.6	18.3	77	174.8	27.7	37	234.1	37.1	97	293.3	46.5
58	57.3	09.1	18	116.5	18.5	78	175.8	27.8	38	235.1	37.2	98	294.3	46.6
59	58.3	09.2	19	117.5	18.6	79	176.8	28.0	39	236.1	37.4	99	295.3	46.8
60	59.3	09.4	20	118.5	18.8	80	177.8	28.2	40	237.0	37.5	300	296.3	46.9
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 81 Deg.

Difference of Latitude and Departure for 10 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.2	61	60.1	10.6	121	119.2	21.0	181	178.2	31.4	241	237.3	41.8
2	02.0	00.3	62	61.1	10.8	22	120.1	21.2	82	179.2	31.6	42	238.3	42.0
3	03.0	00.5	63	62.0	10.9	23	121.1	21.3	83	180.2	31.7	43	239.3	42.1
4	03.9	00.7	64	63.0	11.1	24	122.1	21.5	84	181.2	31.9	44	240.3	42.3
5	04.9	00.9	65	64.0	11.2	25	123.1	21.7	85	182.2	32.1	45	241.3	42.5
6	05.9	01.0	66	65.0	11.4	26	124.1	21.8	86	183.2	32.3	46	242.3	42.7
7	06.9	01.2	67	66.0	11.6	27	125.1	22.0	87	184.2	32.4	47	243.2	42.8
8	07.9	01.4	68	67.0	11.8	28	126.1	22.2	88	185.1	32.6	48	244.2	43.0
9	08.9	01.6	69	68.0	12.0	29	127.0	22.4	89	186.1	32.8	49	245.2	43.2
10	09.8	01.7	70	68.9	12.1	30	128.0	22.5	90	187.1	32.9	50	246.2	43.4
11	10.8	01.9	71	60.9	12.3	131	129.0	22.7	191	188.1	33.1	251	247.2	43.5
12	11.8	02.1	72	70.9	12.5	32	130.0	22.9	92	189.1	33.3	52	248.2	43.7
13	12.8	02.3	73	71.9	12.7	33	131.0	23.1	93	190.1	33.5	53	249.2	43.9
14	13.8	02.4	74	72.9	12.8	34	132.0	23.2	94	191.0	33.6	54	250.1	44.0
15	14.8	02.6	75	73.9	13.0	35	132.9	23.4	95	192.0	33.8	55	251.1	44.2
16	15.8	02.8	76	74.8	13.2	36	133.9	23.6	96	193.0	34.0	56	252.1	44.4
17	16.7	02.9	77	75.8	13.4	37	134.9	23.8	97	194.0	34.2	57	253.1	44.6
18	17.7	03.1	78	76.8	13.5	38	135.9	23.9	98	195.0	34.3	58	254.1	44.7
19	18.7	03.3	79	77.8	13.7	39	136.9	24.1	99	196.0	34.5	59	255.1	44.9
20	19.7	03.5	80	78.8	13.9	40	137.9	24.3	200	197.0	34.7	60	256.0	45.1
21	20.7	03.6	81	79.8	14.0	141	138.9	24.4	201	197.9	34.9	261	257.0	45.3
22	21.7	03.8	82	80.8	14.2	42	139.8	24.6	02	198.9	35.0	62	258.0	45.4
23	22.7	04.0	83	81.7	14.4	43	140.8	24.8	03	199.9	35.2	63	259.0	45.6
24	23.6	04.2	84	82.7	14.6	44	141.8	25.0	04	200.9	35.4	64	260.0	45.8
25	24.6	04.3	85	83.7	14.7	45	142.8	25.1	05	201.9	35.5	65	261.0	46.0
26	25.6	04.5	86	84.7	14.9	46	143.8	25.3	06	202.9	35.7	66	262.0	46.1
27	26.6	04.7	87	85.7	15.1	47	144.8	25.5	07	203.9	35.9	67	262.9	46.3
28	27.6	04.9	88	86.7	15.3	48	145.7	25 7	08	204.9	36.1	68	263.9	46.5
29	28.6	05.0	89	87.6	15.4	49	146.7	25.8	09	205.8	36.2	69	264.9	46.6
30	29.5	05.2	90	88.6	15.6	50	147.7	26.0	10	206.8	36.4	70	265.9	46.8
31	30.5	05.4	91	89.6	15.8	151	148.7	26.2	211	207.8	36.6	271	266.9	47.0
32	31.5	05.5	92	90.6	16.0	52	149.7	26.4	12	208.8	36.8	72	267.9	47.2
33	32.5	05.7	93	91.6	16.1	53	150.7	26.5	13	219.8	36.9	73	268.9	47.3
34	33.5	05.9	94	92.6	16.3	54	151.7	26.7	14	210.7	37.1	74	269.8	47.5
35	34.5	06.1	95	93.6	16.5	55	152.6	26.9	15	211.7	37.3	75	270.8	47.7
36	35.5	06.2	96	94.5	16.6	56	153.6	27.1	16	212.7	37.5	76	271.8	47.9
37	36.4	06.4	97	95.5	16.8	57	154.6	27.2	17	213.7	37.6	77	272.8	48.0
38	37.4	06.6	98	96.5	17 0	58	155.6	27 4	18	214.7	37.8	78	273.8	48.2
39	38.4	06.8	99	97.5	17.2	59	156.6	27.6	19	215.7	38.0	79	274.8	48.4
40	39.4	06.9	100	98 5	17.3	60	157.6	27.7	20	216.7	38.1	80	275.7	48.6
41	40.4	07.1	101	99.5	17.5	161	158.6	27.9	221	217.6	38.3	281	276.7	48.7
42	41.4	07.3	02	100.4	17.7	62	159.5	28.1	22	218.6	38.5	82	277.7	48.9
43	42.3	07.5	03	101.4	17.9	63	160.5	28.3	23	219.6	38.7	83	278.7	49.1
44	43.3	07.6	04	102.4	18.0	64	161.5	28.4	24	220.6	38.8	84	279.7	49.2
45	44.3	07.8	05	103.4	18.2	65	162.5	28.6	25	221.6	39.0	85	280.7	49.4
46	45.3	08.0	06	104.4	18.4	66	163.5	29.8	26	222.6	39.2	86	281.6	49.6
47	46.3	08.1	07	105.4	18.6	67	164.5	29.0	27	223.5	39.4	87	282.6	49.8
48	47.3	08.3	08	106.4	18.7	68	165.4	29.1	28	224.5	39.5	88	283.6	49.9
49	48.3	08.5	09	107.3	18.9	69	166.4	29.3	29	225.5	39.7	89	284.6	50.1
50	49.2	08.7	10	108.3	19.1	70	167.4	29.5	30	226.5	39.9	90	285.6	50.3
51	50.2	08.8	111	109.3	19.2	171	168.4	29.7	231	227.5	40.1	291	286.6	50.5
52	51.2	09.0	12	110.3	19.4	72	169.4	29.8	32	228.5	40.2	92	287.6	50.6
53	52.2	09.2	13	111.3	19.6	73	170.4	30.0	33	229.5	40.4	93	288.5	50.8
54	53.2	09.4	14	112.3	19.8	74	171.4	30.2	34	230.4	40.6	94	289.5	51.0
55	54.2	09.5	15	113.3	19.9	75	172.3	30.3	35	231.4	40.7	95	290.5	51.2
56	55.1	09.7	16	114.2	20.1	76	173.3	30.5	36	232.4	40.9	96	291.5	51.3
57	56.1	09.9	17	115.2	20.3	77	174.3	30.7	37	233.4	41.1	97	292.5	51.5
58	57.1	10.1	18	116.2	20.5	78	175.3	30.9	38	234.4	41.3	98	293.5	51.7
59	58.1	10.2	19	117.2	20.6	79	176.3	31.0	39	235.4	41.4	99	294.5	51.8
60	59.1	10.4	20	118.2	20.8	80	177.3	31.2	40	236.3	41.6	300	295.4	52.0
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 80 Deg.

Difference of Latitude and Departure for 11 Degrees.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Den
1	01.0	00.2	61	59.9	11.6	121	118.8	23.1	181	177.7	34.5	241	236.6	46.0
2	02.0	00.4	62	60.9	11.8	22	119.8	23.3	82	178.6	34.7	42	237.5	46.2
3	02.9	00.6	63	61.8	12.0	23	120.7	23.5	83	179.6	34.9	43	238.5	46.4
4	03.9	00.8	64	62.8	12.2	24	121.7	23.7	84	180.6	35.1	44	239.5	46.6
5	04.9	01.0	65	63.8	12.4	25	122.7	23.9	85	181.6	35.3	45	240.5	46.7
6	05.9	01.1	66	64.8	12.6	26	123.7	24.0	86	182.6	35.5	46	241.5	47.0
7	06.9	01.3	67	65.8	12.8	27	124.7	24.2	87	183.6	35.7	47	242.5	47.1
8	07.9	01.5	68	66.7	13.0	28	125.6	24.4	88	184.5	35.9	48	243.4	47.3
9	08.8	01.7	69	67.7	13.2	29	126.6	24.6	89	185.5	36.1	49	244.4	47.5
10	09.8	01.9	70	68.7	13.4	30	127.6	24.8	90	186.5	36.3	50	245.4	47.7
11	10.8	02.1	71	69.7	13.5	131	128.6	25.0	191	187.5	36.4	251	246.4	47.9
12	11.8	02.3	72	70.7	13.7	32	129.6	25.2	92	188.5	36.6	52	247.4	48.1
13	12.8	02.5	73	71.7	13.9	33	130.6	21.4	93	189.4	36.8	53	248.3	48.3
14	13.7	02.7	74	72.6	14.1	34	131.5	25.6	94	190.4	37.0	54	249.3	48.5
15	14.7	02.9	75	73.6	14.3	35	132.5	25.8	95	191.4	37.2	55	250.3	48.7
16	15.7	03.1	76	74.6	14.5	36	133.5	25.9	96	192.4	37.4	56	251.3	48.8
17	16.7	03.2	77	75.6	14.7	37	134.5	26.1	97	193.4	37.6	57	252.3	49.0
18	17.7	03.4	78	76.6	14.9	38	135.5	26.3	98	194.4	37.8	58	253.2	49.2
19	18.7	03.6	79	77.5	15.1	39	136.4	26.5	99	195.4	38.0	59	254.2	49.4
20	19.6	03.8	80	78.5	15.3	40	137.4	26.7	200	196.3	38.2	60	255.2	49.6
21	20.6	04.0	81	79.5	15.5	141	138.4	26.9	201	197.3	38.4	261	256.2	49.8
22	21.6	04.2	82	80.5	15.6	42	139.4	27.1	02	198.3	38.5	62	257.2	50.0
23	22.6	04.4	83	81.5	15.8	43	140.4	27.3	03	199.3	38.7	63	258.2	50.2
24	23.6	04.6	84	82.5	16.0	44	141.3	27.5	04	200.2	38.9	64	259.1	50.4
25	24.5	04.8	85	83.4	16.2	45	142.3	27.7	05	201.2	39.1	65	260.1	50.6
26	25.5	05.0	86	84.4	16.4	46	143.3	27.9	06	202.2	39.3	66	261.1	50.8
27	26.5	05.2	87	85.4	16.6	47	144.3	28.0	07	203.2	39.5	67	262.1	50.9
28	27.5	05.3	88	86.4	16.8	48	145.3	28.2	08	204.2	39.7	68	263.1	51.1
29	28.5	05.5	89	87.4	17.0	49	146.3	28.4	09	205.2	39.9	69	264.0	51.3
30	29.4	05.7	90	88.3	17.2	50	147.2	28.6	10	206.1	40.1	70	265.0	51.5
31	30.4	05.9	91	89.3	17.4	151	148.2	28.8	211	207.1	40.3	271	266.0	51.7
32	31.4	06.1	92	90.3	17.6	52	149.2	29.0	12	208.1	40.4	72	267.0	51.9
33	32.4	06.3	93	91.3	17.7	53	150.2	29.2	13	209.1	40.6	73	268.0	52.1
34	33.4	06.5	94	92.3	17.9	54	151.2	29.4	14	210.1	40.8	74	269.0	52.3
35	34.4	06.7	95	93.3	18.1	55	152.1	29.6	15	211.0	41.0	75	269.9	52.5
36	35.3	06.9	96	94.2	18.3	56	153.1	29.8	16	212.0	41.2	76	270.9	52.7
37	36.3	07.1	97	95.2	18.5	57	154.1	30.0	17	213.0	41.4	77	271.9	52.9
38	37.3	07.3	98	96.2	18.7	58	155.1	30.1	18	214.0	41.6	78	272.9	53.0
39	38.3	07.4	99	97.2	18.9	59	156.1	30.3	19	215.0	41.8	79	273.9	53.2
40	39.3	07.6	100	98.2	19.1	60	157.1	30.5	20	215.9	42.0	80	274.8	53.4
41	40.2	07.8	101	99.1	19.3	161	158.0	30.7	221	216.9	42.2	281	275.8	53.6
42	41.2	08.0	02	100.1	19.5	62	159.0	30.9	22	217.9	42.4	82	276.8	53.8
43	42.2	08.2	03	101.1	19.7	63	160.0	31.1	23	218.9	42.5	83	277.8	54.0
44	43.2	08.4	04	102.1	19.8	64	161.0	31.3	24	219.9	42.7	84	278.8	54.2
45	44.2	08.6	05	103.1	20.0	65	162.0	31.5	25	220.9	42.9	85	279.8	54.4
46	45.2	08.8	06	104.0	20.2	66	162.9	31.7	26	221.8	43.1	86	280.7	54.6
47	46.1	09.0	07	105.0	20.4	67	163.9	31.9	27	222.8	43.3	87	281.7	54.8
48	47.1	09.2	08	106.0	20.6	68	164.9	32.1	28	223.8	43.5	88	282.7	55.0
49	48.1	09.3	09	107.0	20.8	69	165.9	32.2	29	224.8	43.7	89	283.7	55.1
50	49.1	09.5	10	108.0	21.0	70	166.9	32.4	30	225.8	43.9	90	284.7	55.3
51	50.1	09.7	111	109.0	21.2	171	167.9	32.6	231	226.7	44.1	291	285.6	55.5
52	51.0	09.9	12	109.9	21.4	72	168.8	32.8	32	227.7	44.3	92	286.6	55.7
53	52.0	10.1	13	110.9	21.6	73	169.8	33.0	33	228.7	44.5	93	287.6	55.9
54	53.0	10.3	14	111.9	21.8	74	170.8	33.2	34	229.7	44.6	94	288.6	56.0
55	54.0	10.5	15	112.9	21.9	75	171.8	33.4	35	230.7	44.8	95	289.6	56.3
56	55.0	10.7	16	113.9	22.1	76	172.8	33.6	36	231.7	45.0	96	290.5	56.5
57	56.0	10.9	17	114.8	22.3	77	173.7	33.8	37	232.6	45.2	97	291.5	56.7
58	56.9	11.1	18	115.8	22.5	78	174.7	34.0	38	233.6	45.4	98	292.5	56.5
59	57.9	11.3	19	116.8	22.7	79	175.7	34.2	39	234.6	45.6	99	293.5	57.0
60	58.9	11.4	20	117.8	22.9	80	176.7	34.3	40	235.6	45.8	300	294.5	57.2
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 79 Deg.

Difference of Latitude and Departure for 12 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.2	61	59.7	12.7	121	118.3	25.2	181	177.0	37.6	241	235.7	50.1
2	02.0	00.4	62	60.6	12.9	22	119.3	25.4	82	178.0	37.9	42	236.7	50.3
3	02.9	00.6	63	61.6	13.1	23	120.3	25.6	83	179.0	38.1	43	237.7	50.5
4	03.9	00.8	64	62.6	13.3	24	121.3	25.8	84	180.0	38.3	44	238.6	50.8
5	04.9	01.0	65	63.6	13.5	25	122.3	26.0	85	180.9	38.5	45	239.6	51.0
6	05.9	01.2	66	64.5	13.7	26	123.2	26.2	86	181.9	38.7	46	240.6	51.2
7	06.8	01.5	67	65.5	13.9	27	124.2	26.4	87	182.9	38.9	47	241.6	51.4
8	07.8	01.7	68	66.5	14.1	28	125.2	26.6	88	183.9	39.1	48	242.5	51.6
9	08.8	01.9	69	67.5	14.4	29	126.2	26.8	89	184.8	39.3	49	243.5	51.8
10	09.8	02.1	70	68.5	14.6	30	127.1	27.0	90	185.8	39.5	50	244.5	52.0
11	10.8	02.3	71	69.4	14.8	131	128.1	27.2	191	186.8	39.7	251	245.5	52.2
12	11.7	02.5	72	70.4	15.0	32	129.1	27.5	92	187.8	39.9	52	246.5	52.4
13	12.7	02.7	73	71.4	15.2	33	130.1	27.7	93	188.8	40.1	53	247.4	52.6
14	13.7	02.9	74	72.4	15.4	34	131.1	27.9	94	189.7	40.4	54	248.4	52.8
15	14.7	03.1	75	73.4	15.6	35	132.0	28.1	95	190.7	40.6	55	249.4	53.0
16	15.6	03.3	76	74.3	15.8	36	133.0	28.3	96	191.7	40.8	56	250.4	53.2
17	16.6	03.5	77	75.3	16.0	37	134.0	28.5	97	192.7	41.0	57	251.3	53.5
18	17.6	03.7	78	76.3	16.2	38	135.0	28.7	98	193.6	41.2	58	252.3	53.7
19	18.6	04.0	79	77.3	16.4	39	135.9	28.9	99	194.6	41.4	59	253.3	53.9
20	19.6	04.2	80	78.2	16.6	40	136.9	29.1	200	195.6	41.6	60	254.3	54.1
21	20.5	04.4	81	79.2	16.8	141	137.9	29.3	201	196.6	41.8	261	255.3	54.3
22	21.5	04.6	82	80.2	17.1	42	138.9	29.5	02	197.6	42.0	62	256.2	54.5
23	22.5	04.8	83	81.2	17.3	43	139.9	29.7	03	198.5	42.2	63	257.2	54.7
24	23.5	05.0	84	82.2	17.5	44	140.8	30.0	04	199.5	42.4	64	258.2	54.9
25	24.5	05.2	85	83.1	17.7	45	141.8	30.2	05	200.5	42.6	65	259.2	55.1
26	25.4	05.4	86	84.1	17.9	46	142.8	30.4	06	201.5	42.8	66	260.1	55.3
27	26.4	05.6	87	85.1	18.0	47	143.8	30.6	07	202.4	43.1	67	261.1	55.5
28	27.4	05.8	88	86.1	18.3	48	144.7	30.8	08	203.4	43.3	68	262.1	55.7
29	28.4	06.0	89	87.0	18.5	49	145.7	31.0	09	204.4	43.5	69	263.1	56.0
30	29.3	06.2	90	88.0	18.7	50	146.7	31.2	10	205.4	43.7	70	264.1	56.2
31	30.3	06.4	91	89.0	18.9	151	147.7	31.4	211	206.4	43.9	271	265.0	56.4
32	31.3	06.7	92	90.0	19.1	52	148.7	31.6	12	207.3	44.1	72	266.0	56.6
33	32.3	06.9	93	91.0	19.3	53	149.6	31.8	13	208.3	44.3	73	267.0	56.8
34	33.3	07.1	94	91.9	19.6	54	150.6	32.0	14	209.3	44.5	74	268.0	57.0
35	34.2	07.3	95	92.9	19.8	55	151.6	32.2	15	210.3	44.7	75	269.0	57.2
36	35.2	07.5	96	93.9	20.0	56	152.6	32.4	16	211.2	44.9	76	269.9	57.4
37	36.2	07.7	97	94.9	20.2	57	153.5	32.7	17	212.2	45.1	77	270.9	57.6
38	37.2	07.9	98	95.8	20.4	58	154.5	32.9	18	213.2	45.3	78	271.9	57.8
39	38.1	08.1	99	96.8	20.6	59	155.5	33.1	19	214.2	45.6	79	272.9	58.0
40	39.1	08.3	100	97.8	20.8	60	156.5	33.3	20	215.2	45.8	80	273.8	58.2
41	40.1	08.5	101	98.8	21.0	161	157.5	33.5	221	216.1	46.0	281	274.8	58.4
42	41.1	08.7	02	99.8	21.2	62	158.4	33.7	22	217.1	46.2	82	275.8	58.7
43	42.1	08.9	03	100.7	21.4	63	159.4	33.9	23	218.1	46.4	83	276.8	58.9
44	43.0	09.2	04	101.7	21.6	64	160.4	34.1	24	219.1	46.6	84	277.8	59.1
45	44.0	09.4	05	102.7	21.8	65	161.4	34.3	25	220.1	46.8	85	278.7	59.3
46	45.0	09.6	06	103.7	22.0	66	162.3	34.5	26	221.0	47.0	86	279.7	59.5
47	46.0	09.8	07	104.6	22.3	67	163.3	34.7	27	222.0	47.2	87	280.7	59.7
48	46.9	10.0	08	105.6	22.5	68	164.3	34.9	28	223.0	47.4	88	281.7	59.9
49	47.9	10.2	09	106.6	22.7	69	165.3	35.2	29	224.0	47.6	89	282.6	60.1
50	48.9	10.4	10	107.6	22.8	70	166.3	35.4	30	224.9	47.8	90	283.6	60.3
51	49.9	10.6	111	108.6	23.1	171	167.2	35.6	231	225.9	48.0	291	284.6	60.5
52	50.9	10.8	12	109.5	23.3	72	168.2	35.8	32	226.9	48.3	92	285.6	60.7
53	51.8	11.0	13	110.5	23.5	73	169.2	36.0	33	227.9	48.5	93	286.6	60.9
54	52.8	11.2	14	111.5	23.7	74	170.2	36.2	34	228.9	48.7	94	287.5	61.2
55	53.8	11.4	15	112.4	23.9	75	171.2	36.1	35	229.8	48.9	95	288.5	61.4
56	54.8	11.6	16	113.4	24.1	76	172.1	36.6	36	230.8	49.1	96	289.5	61.6
57	55.7	11.9	17	114.4	24.3	77	173.1	36.8	37	231.8	49.3	97	290.5	61.8
58	56.7	12.1	18	115.4	24.5	78	174.1	37.0	38	232.8	49.5	98	291.4	62.0
59	57.7	12.3	19	116.4	24.8	79	175.1	37.2	39	233.7	49.7	99	292.4	62.2
60	58.7	12.5	20	117.4	25.0	80	176.0	37.4	40	234.7	49.9	300	293.4	62.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 78 Deg.

Difference of Latitude and Departure for 13 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.2	61	59.4	13.7	121	117.9	27.2	181	176.4	40.7	241	234.8	54.2
2	01.9	00.4	62	60.4	13.9	22	118.9	27.4	82	177.3	40.9	42	235.8	54.4
3	02.9	00.7	63	61.4	14.2	23	119.8	27.7	83	178.3	41.2	43	236.8	54.7
4	03.9	00.9	64	62.4	14.4	24	120.8	27.9	84	179.3	41.4	44	237.8	54.9
5	04.9	01.1	65	63.3	14.6	25	121.8	28.1	85	180.3	41.6	45	238.7	55.1
6	05.8	01.3	66	64.3	14.8	26	122.8	28.3	86	181.2	41.8	46	239.7	55.3
7	06.8	01.6	67	65.3	15.1	27	123.7	28.6	87	182.2	42.1	47	240.7	55.6
8	07.8	01.8	68	66.3	15.3	28	124.7	28.8	88	183.2	42.3	48	241.6	55.8
9	08.8	02.0	69	67.2	15.5	29	125.7	29.0	89	184.2	42.5	49	242.6	56.0
10	09.7	02.2	70	68.2	15.7	30	126.7	29.2	90	185.1	42.7	50	243.6	56.2
11	10.7	02.5	71	69.2	16.0	131	127.6	29.5	191	186.1	43.0	251	244.6	56.5
12	11.7	02.7	72	70.2	16.2	32	128.6	29.7	92	187.1	43.2	52	245.5	56.7
13	12.7	02.9	73	71.1	16.4	33	129.6	29.9	93	188.1	43.4	53	246.5	56.9
14	13.6	03.1	74	72.1	16.6	34	130.6	30.1	94	189.0	43.6	54	247.5	57.1
15	14.6	03.4	75	73.1	16.9	35	131.5	30.4	95	190.0	43.9	55	248.5	57.4
16	15.6	03.6	76	74.1	17.1	36	132.5	30.6	96	191.0	44.1	56	249.4	57.6
17	16.6	03.8	77	75.0	17.3	37	133.5	30.8	97	192.0	44.3	57	250.4	57.8
18	17.5	04.0	78	76.0	17.5	38	134.5	31.0	98	192.9	44.5	58	251.4	58.0
19	18.5	04.3	79	77.0	17.8	39	135.4	31.3	99	193.9	44.8	59	252.4	58.3
20	19.5	04.5	80	78.0	18.0	40	136.4	31.5	200	194.9	45.0	60	253.3	58.5
21	20.5	04.7	81	78.9	18.2	141	137.4	31.7	201	195.9	45.2	261	254.3	58.7
22	21.4	04.9	82	79.9	18.4	42	138.4	31.9	02	196.8	45.4	62	255.3	58.9
23	22.4	05.2	83	80.9	18.7	43	139.3	32.2	03	197.8	45.7	63	256.3	59.2
24	23.4	05.4	84	81.8	18.9	44	140.3	32.4	04	198.8	45.9	64	257.2	59.4
25	24.4	05.6	85	82.8	19.1	45	141.3	32.6	05	199.7	46.1	65	258.2	59.6
26	25.3	05.8	86	83.8	19.3	46	142.3	32.8	06	200.7	46.3	66	259.2	59.8
27	26.3	06.1	87	84.8	19.6	47	143.2	33.1	07	201.7	46.6	67	260.2	60.1
28	27.3	06.3	88	85.7	19.8	48	144.2	33.3	08	202.7	46.8	68	261.1	60.3
29	28.3	06.5	89	86.7	20.0	49	145.2	33.5	09	203.6	47.0	69	262.1	60.5
30	29.2	06.7	90	87.7	20.2	50	146.2	33.7	10	204.6	47.2	70	263.1	60.7
31	30.2	07.0	91	88.7	20.5	151	147.1	34.0	211	205.6	47.5	271	264.1	61.0
32	31.2	07.2	92	89.6	20.7	52	148.1	34.2	12	206.6	47.7	72	265.0	61.2
33	32.2	07.4	93	90.6	20.9	53	149.1	34.4	13	207.5	47.9	73	266.0	61.4
34	33.1	07.6	94	91.6	21.1	54	150.1	34.6	14	208.5	48.1	74	267.0	61.6
35	34.1	07.9	95	92.6	21.4	55	151.0	34.9	15	209.5	48.4	75	268.0	61.9
36	35.1	08.1	96	93.5	21.6	56	152.0	35.1	17	210.5	48.6	76	268.9	62.1
37	36.1	08.3	97	94.5	21.8	57	153.0	35.3	16	211.4	48.8	77	269.9	62.3
38	37.0	08.5	98	95.5	22.0	58	154.0	35.5	18	212.4	49.0	78	270.9	62.5
39	38.0	08.8	99	96.5	22.3	59	154.9	35.8	19	213.4	49.3	79	271.9	62.8
40	39.0	08.0	100	97.4	22.5	60	155.9	35.0	20	214.4	49.5	80	272.8	63.0
41	39.9	09.2	101	98.4	22.7	161	156.9	36.2	221	215.3	49.7	281	273.8	63.2
42	40.9	09.4	02	99.4	22.9	62	157.9	36.4	22	216.3	49.9	82	274.8	63.4
43	41.9	09.7	03	100.4	23.2	63	158.8	36.7	23	217.3	50.2	83	275.8	63.7
44	42.9	09.9	04	101.3	23.4	64	159.8	36.9	24	218.3	50.4	84	276.7	63.9
45	43.8	10.1	05	102.3	23.6	65	160.8	37.1	25	219.2	50.6	85	277.7	64.1
46	44.8	10.3	06	103.3	23.8	66	161.7	37.3	26	220.2	50.8	86	278.7	64.3
47	45.8	10.6	07	104.3	24.1	67	162.7	37.6	27	221.2	51.1	87	279.6	64.6
48	46.8	10.8	08	105.2	24.3	68	163.7	37.8	28	222.2	51.3	88	280.6	64.8
49	47.7	11.0	09	106.2	24.5	69	164.7	38.0	29	223.1	51.5	89	281.6	65.0
50	48.7	11.2	10	107.2	24.7	70	165.6	38.2	30	224.1	51.7	90	282.6	65.2
51	49.7	11.5	111	108.2	25.0	171	166.6	38.5	231	225.1	52.0	291	283.5	65.5
52	50.7	11.7	12	109.1	25.2	72	167.6	38.7	32	226.1	52.2	92	284.5	65.7
53	51.6	11.9	13	110.1	25.4	73	168.6	38.9	33	227.0	52.4	93	285.5	65.9
54	52.6	12.1	14	111.1	25.6	74	169.5	39.1	34	228.0	52.6	94	286.5	66.1
55	53.6	12.4	15	112.1	25.9	75	170.5	39.4	35	229.0	52.9	95	287.4	66.4
56	54.6	12.6	16	113.0	26.1	76	171.5	39.6	36	230.0	53.1	96	288.4	66.6
57	55.5	12.8	17	114.0	26.3	77	172.5	39.8	37	230.9	53.3	97	289.4	66.8
58	56.5	13.0	18	115.0	26.5	78	173.4	40.0	38	231.9	53.5	98	290.4	67.0
59	57.5	13.3	19	116.0	26.8	79	174.4	40.3	39	232.9	53.8	99	291.3	67.3
60	58.5	13.5	20	116.9	27.0	80	175.4	40.5	40	233.9	54.0	300	292.3	67.5
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 77 Deg.

Difference of Latitude and Departure for 14 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.2	61	59.2	14.8	121	117.4	29.3	181	175.6	43.8	241	233.8	58.3
2	01.9	00.5	62	60.2	15.0	22	118.4	29.5	82	176.6	44.0	42	234.8	58.6
3	02.9	00.7	63	61.1	15.2	23	119.3	29.8	83	177.6	44.3	43	235.8	58.8
4	03.9	01.0	64	62.1	15.5	24	120.3	30.0	84	178.5	44.5	44	236.7	59.0
5	04.9	01.2	65	63.1	15.7	25	121.3	30.2	85	179.5	44.8	45	237.7	59.3
6	05.8	01.5	66	64.0	16.0	26	122.3	30.5	86	180.5	45.0	46	238.7	59.5
7	06.8	01.7	67	65.0	16.2	27	123.2	30.7	87	181.4	45.3	47	239.7	59.8
8	07.8	01.9	68	66.0	16.5	28	124.2	31.0	88	182.4	45.5	48	240.6	60.0
9	08.7	02.2	69	66.9	16.7	29	125.2	31.2	89	183.4	45.7	49	241.6	60.3
10	09.7	02.4	70	67.9	16.9	30	126.1	31.5	90	184.4	46.0	50	242.6	60.5
11	10.7	02.7	71	68.9	17.2	131	127.1	31.7	191	185.3	46.2	251	243.5	60.7
12	11.6	02.9	72	69.9	17.4	32	128.1	31.9	92	186.3	46.5	52	244.5	61.0
13	12.6	03.1	73	70.8	17.7	33	129.0	32.2	93	187.3	46.7	53	245.5	61.2
14	13.6	03.4	74	71.8	17.9	34	130.0	32.4	94	188.2	46.9	54	246.4	61.5
15	14.6	03.6	75	72.8	18.1	35	131.0	32.7	95	189.2	47.2	55	247.4	61.7
16	15.5	03.9	76	73.7	18.4	36	132.0	32.9	96	190.2	47.4	56	248.4	62.0
17	16.5	04.1	77	74.7	18.6	37	132.9	33.2	97	191.1	47.7	57	249.4	62.2
18	17.5	04.4	78	75.7	18.9	38	133.9	33.4	98	192.1	47.9	58	250.3	62.4
19	18.4	04.6	79	76.7	19.1	39	134.9	33.6	99	193.1	48.2	59	251.3	62.7
20	19.4	04.8	80	77.6	19.4	40	135.9	33.9	200	194.1	48.4	60	252.3	62.9
21	20.4	95.1	81	78.6	19.6	141	136.8	34.1	201	195.0	48.6	261	253.2	63.2
22	21.3	05.3	82	79.6	19.8	42	137.8	34.4	02	196.0	48.9	62	254.2	63.4
23	22.3	05.6	83	80.5	20.1	43	138.7	34.6	03	197.0	49.1	63	255.2	63.6
24	23.3	05.8	84	81.5	20.3	44	139.7	34.8	04	197.9	49.4	64	256.2	63.9
25	24.3	06.0	85	82.5	20.6	45	140.7	35.1	05	198.9	49.6	65	257.1	64.1
26	25.2	06.3	86	83.4	20.8	46	141.7	35.3	06	199.9	49.9	66	258.1	64.4
27	26.2	06.5	87	84.4	21.1	47	142.6	35.6	07	200.8	50.1	67	259.1	64.6
28	27.2	06.8	88	85.4	21.3	48	143.6	35.8	08	201.8	50.3	68	260.0	64.9
29	28.1	07.0	89	86.4	21.5	49	144.6	36.1	09	202.8	50.6	69	261.0	65.1
30	29.1	07.3	90	87.3	21.8	50	145.5	36.3	10	203.8	50.8	70	262.0	65.3
31	30.1	07.5	91	88.3	22.0	151	146.5	36.5	211	204.7	51.1	271	262.9	65.6
32	31.0	07.7	92	89.3	22.3	52	147.5	36.8	12	205.7	51.3	72	263.9	65.8
33	32.0	08.0	93	90.2	22.5	53	148.5	37.0	13	206.7	51.5	73	264.9	66.1
34	33.0	08.2	94	91.2	22.7	54	149.4	37.3	14	207.6	51.8	74	265.9	66.3
35	34.0	08.5	95	92.2	23.0	55	150.4	37.5	15	208.6	52.0	75	266.8	66.5
36	34.9	08.7	96	93.1	23.2	56	151.4	37.7	16	209.6	52.3	76	267.8	66.8
37	35.9	09.0	97	94.1	23.5	57	152.3	38.0	17	210.5	52.5	77	268.8	67.0
38	36.9	09.2	98	95.1	23.7	58	153.3	38.2	18	211.5	52.8	78	269.7	67.3
39	37.8	09.4	99	96.1	24.0	59	154.3	38.5	19	212.5	53.0	79	270.7	67.5
40	38.8	09.7	100	97.0	24.2	60	155.2	38.7	20	213.5	53.2	80	271.7	67.8
41	39.8	09.9	101	98.0	24.4	161	156.2	39.0	221	214.4	53.5	281	272.6	68.0
42	40.8	10.2	02	99.0	24.7	62	157.2	39.2	22	215.4	53.7	82	273.6	68.2
43	41.7	10.4	03	99.9	24.9	63	158.2	39.4	23	216.4	54.0	83	274.6	68.5
44	42.7	10.6	04	100.9	25.2	64	159.1	39.7	24	217.3	54.2	84	275.6	68.7
45	43.7	10.9	05	101.9	25.4	65	160.1	39.9	25	218.3	54.4	85	276.5	69.0
46	44.6	11.1	06	102.8	25.7	66	161.1	40.2	26	219.3	54.7	86	277.5	69.2
47	45.6	11.4	07	103.8	25.9	67	162.0	40.4	27	220.3	54.9	87	278.5	69.5
48	46.6	11.6	08	104.8	26.1	68	163.0	40.7	28	221.2	55.2	88	279.4	69.7
49	47.5	11.9	09	105.8	26.4	69	164.0	40.9	29	222.2	55.4	89	280.4	69.9
50	48.5	12.1	10	106.7	26.6	70	164.9	41.1	30	223.2	55.7	90	281.4	70.2
51	49.5	12.3	111	107.7	26.9	171	165.9	41.4	231	224.1	55.9	291	282.3	70.4
52	50.5	12.6	12	108.7	27.1	72	166.9	41.6	32	225.1	56.1	92	283.3	70.7
53	51.4	12.8	13	109.6	27.3	73	167.9	41.9	33	226.1	56.4	93	284.3	70.9
54	52.4	13.1	14	110.6	27.6	74	168.8	42.1	34	227.0	56.6	94	285.3	71.1
55	53.4	13.3	15	111.6	27.8	75	169.8	42.3	35	228.0	56.9	95	286.2	71.4
56	54.3	13.6	16	112.6	28.1	76	170.8	42.7	36	229.0	57.1	96	287.2	71.6
57	55.3	13.8	17	113.5	28.3	77	171.7	42.8	37	230.0	57.4	97	288.2	71.9
58	56.3	14.0	18	114.5	28.6	78	172.7	43.1	38	230.9	57.6	98	289.1	72.1
59	57.2	14.3	19	115.5	28.8	79	173.7	43.3	39	231.9	57.8	99	290.1	72.4
60	58.2	14.5	20	116.4	29.0	80	174.6	43.6	40	232.9	58.1	300	291.1	72.6
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 76 Deg.

Difference of Latitude and Departure for 15 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.3	61	58.9	15.8	121	116.9	31.3	181	174.8	46.8	241	232.8	62.4
2	01.9	00.5	62	59.9	16.0	22	117.8	31.6	82	175.8	47.1	42	233.7	62.6
3	02.9	00.8	63	60.9	16.3	23	118.8	31.8	83	176.8	47.4	43	234.7	62.9
4	03.9	01.0	64	61.8	16.6	24	119.8	32.1	84	177.7	47.6	44	235.7	63.1
5	04.8	01.3	65	62.8	16.8	25	120.7	32.4	85	178.7	47.9	45	236.6	63.4
6	05.8	01.6	66	63.7	17.1	26	121.7	32.6	86	179.7	48.1	46	237.6	63.7
7	06.8	01.8	67	64.7	17.3	27	122.7	32.9	87	180.6	48.4	47	238.6	63.9
8	07.7	02.1	68	65.7	17.6	28	123.6	33.1	88	181.6	48.7	48	239.5	64.2
9	08.7	02.3	69	66.6	17.9	29	124.6	33.4	89	182.6	48.9	49	240.5	64.4
10	09.7	02.6	70	67.6	18.1	30	125.6	33.6	90	183.5	49.2	50	241.5	64.7
11	10.6	02.8	71	68.6	18.4	131	126.5	33.9	191	184.5	49.4	251	242.4	65.0
12	11.6	03.1	72	69.5	18.6	32	127.5	34.2	92	185.5	49.7	52	243.4	65.2
13	12.6	03.4	73	70.5	18.9	33	128.5	34.4	93	186.4	49.9	53	244.4	65.5
14	13.5	03.6	74	71.5	19.2	34	129.4	34.7	94	187.4	50.2	54	245.3	65.7
15	14.5	03.9	75	72.4	19.4	35	130.4	34.9	95	188.4	50.5	55	246.3	66.0
16	15.5	04.1	76	73.4	19.7	36	131.4	35.2	96	189.3	50.7	56	247.3	66.3
17	16.4	04.4	77	74.4	19.9	37	132.3	35.5	67	190.3	51.0	57	248.2	66.5
18	17.4	04.7	78	75.3	20.2	38	133.3	35.7	98	191.2	51.2	58	249.2	66.8
19	18.4	04.9	79	76.3	20.4	39	134.3	36.0	99	192.2	51.5	59	250.2	67.0
20	19.3	05.2	80	77.3	20.7	40	135.2	36.2	200	193.2	51.8	60	251.1	67.3
21	20.3	05.4	81	78.2	21.0	141	136.2	36.5	201	194.1	52.0	261	252.1	67.5
22	21.2	05.7	82	79.2	21.2	42	137.2	36.7	02	195.1	52.3	62	253.1	67.8
23	22.2	06.0	83	80.2	21.5	43	138.1	37.0	03	196.1	52.5	63	254.0	68.1
24	23.2	06.2	84	81.1	21.7	44	139.1	37.3	04	197.0	52.8	64	255.0	68.3
25	24.1	06.5	85	82.1	22.0	45	140.1	37.5	05	198.0	53.1	65	256.0	68.6
26	25.1	06.7	86	83.1	22.3	46	141.0	37.8	06	199.0	53.3	66	256.9	68.8
27	26.1	07.0	87	84.0	22.5	47	142.0	38.0	07	199.9	53.6	67	257.9	69.1
28	27.0	07.2	88	85.0	22.8	48	143.0	38.3	08	200.9	53.8	68	258.9	69.4
29	28.0	07.5	89	86.0	23.0	49	143.9	38.6	09	201.9	54.1	69	259.8	69.6
30	29.0	07.8	90	86.9	23.3	50	144.9	38.8	10	202.8	54.3	70	260.8	69.9
31	29.9	08.0	91	87.9	23.6	151	145.8	39.1	211	203.8	54.6	271	261.8	70.1
32	30.9	08.3	92	88.9	23.8	52	146.8	39.3	12	204.8	54.9	72	262.7	70.4
33	31.9	08.5	93	89.8	24.1	53	147.8	39.6	13	205.7	55.1	73	263.7	70.7
34	32.8	08.8	94	90.8	24.3	54	148.7	39.9	14	206.7	55.4	74	264.7	70.9
35	33.8	09.1	95	91.8	24.6	55	149.7	40.1	15	207.7	55.6	75	265.6	71.2
36	34.8	09.3	96	92.7	24.8	56	150.7	40.4	16	208.7	55.9	76	266.6	71.4
37	35.7	09.6	97	93.7	25.1	57	151.6	40.6	17	209.6	56.1	77	267.6	71.7
38	36.7	09.8	98	94.7	25.4	58	152.6	40.9	18	210.6	56.4	78	268.5	71.9
39	37.7	10.1	99	95.6	25.6	59	153.6	41.1	19	211.5	56.7	79	269.5	72.2
40	38.6	10.4	100	96.6	25.9	60	154.5	41.4	20	212.5	56.9	80	270.5	72.5
41	39.6	10.6	101	97.6	26.1	161	155.5	41.7	221	213.5	57.2	281	271.4	72.7
42	40.6	10.9	02	98.5	26.4	62	156.5	41.9	22	214.4	57.5	82	272.4	73.0
43	41.5	11.1	03	99.5	26.7	63	157.4	42.2	23	215.4	57.7	83	273.4	73.2
44	42.5	11.4	04	100.5	26.9	64	158.4	42.4	24	210.4	58.0	84	274.3	73.5
45	43.5	11.6	05	101.4	27.2	65	159.4	42.7	25	217.3	58.2	85	275.3	73.8
46	44.4	11.9	06	102.4	27.4	66	160.3	43.0	26	218.3	58.5	86	276.2	74.0
47	45.4	12.2	07	103.4	27.7	67	161.3	43.2	27	219.3	58.7	87	277.2	74.3
48	46.4	12.4	08	104.3	28.0	68	162.3	43.5	28	220.2	59.0	88	278.2	74.5
49	47.3	12.7	09	105.3	28.2	69	163.2	43.7	29	221.2	59.3	89	279.1	74.8
50	48.3	12.9	10	106.2	28.5	70	164.2	44.0	30	222.2	59.5	90	280.1	75.0
51	49.3	13.2	111	107.2	28.7	171	165.2	44.3	231	223.1	59.8	291	281.1	75.3
52	50.2	13.5	12	108.2	29.0	72	166.1	44.5	32	224.1	60.0	92	282.0	75.6
53	51.2	13.7	13	109.1	29.2	73	167.1	44.8	33	225.1	60.3	93	283.0	75.8
54	52.2	14.0	14	110.1	29.5	74	168.1	45.0	34	226.0	60.6	94	284.0	76.1
55	53.1	14.2	15	111.1	29.8	75	169.0	45.3	35	227.0	60.8	95	284.9	76.3
56	54.1	14.5	16	112.0	30.0	76	170.0	45.5	36	228.0	61.1	96	285.9	76.6
57	55.1	14.8	17	113.0	30.3	77	171.0	45.8	37	228.9	61.3	97	286.9	76.9
58	56.0	15.0	18	114.0	30.5	78	171.9	46.1	38	229.9	61.6	98	287.8	77.1
59	57.0	15.3	19	114.9	30.8	79	172.9	46.3	39	230.9	61.9	99	288.8	77.4
60	58.0	15.5	20	115.9	30.1	80	173.9	46.6	40	231.8	62.1	300	289.8	77.6
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 75 Deg.

Difference of Latitude and Departure for 16 Degrees.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	01.0	00.3	61	58.6	16.8	121	116.3	33.3	81	174.0	49.9	241	231.6	66.4
2	01.9	00.6	62	59.6	17.1	22	117.3	33.6	82	174.9	50.2	42	232.6	66.7
3	02.9	00.8	63	60.6	17.4	23	118.2	33.9	83	175.9	50.4	43	233.6	67.0
4	03.8	01.1	64	61.5	17.6	24	119.2	34.2	84	176.8	50.7	44	234.5	67.2
5	04.8	01.4	65	62.5	17.9	25	120.1	34.4	85	177.8	51.0	45	235.5	67.5
6	05.8	01.7	66	63.4	18.2	26	121.1	34.7	86	178.8	51.3	46	236.4	67.8
7	06.7	01.9	67	64.4	18.5	27	122.1	35.0	87	179.7	51.5	47	237.4	68.1
8	07.7	02.2	68	65.4	18.7	28	123.0	35.3	88	180.7	51.8	48	238.4	68.3
9	08.7	02.5	69	66.3	19.0	29	124.0	35.6	89	181.7	52.1	49	239.3	68.6
10	09.6	02.8	70	67.3	19.3	30	124.9	35.8	90	182.6	52.4	50	240.3	68.9
11	10.6	03.0	71	68.2	19.6	131	125.9	36.1	191	183.6	52.6	251	241.2	69.2
12	11.5	03.3	72	69.2	19.8	32	126.9	36.4	92	184.5	52.9	52	242.2	69.5
13	12.5	03.6	73	70.2	20.1	33	127.8	36.7	93	185.5	53.2	53	243.2	69.7
14	13.5	03.9	74	71.1	20.4	34	128.8	36.9	94	186.5	53.5	54	244.1	70.0
15	14.4	04.1	75	72.1	20.7	35	129.8	37.2	95	187.4	53.7	55	245.1	70.3
16	15.4	04.4	76	73.0	20.9	36	130.7	37.5	96	188.4	54.0	56	246.0	70.6
17	16.3	04.7	77	74.0	21.2	37	131.7	37.8	97	189.3	54.3	57	247.0	70.8
18	17.3	05.0	78	75.0	21.5	38	132.6	38.0	98	190.3	54.6	58	248.0	71.1
19	18.3	05.2	79	75.9	21.8	39	133.6	38.3	99	191.3	54.8	59	248.9	71.4
20	19.2	05.5	80	76.9	22.0	40	134.6	38.6	200	192.2	55.1	60	249.9	71.7
21	20.2	05.8	81	77.9	22.3	141	135.5	38.9	201	193.2	55.4	261	250.9	71.9
22	21.1	06.1	82	78.8	22.6	42	136.5	39.1	02	194.1	55.7	62	251.8	72.2
23	22.1	06.3	83	79.8	22.9	43	137.4	39.4	03	195.1	55.9	63	252 8	72.5
24	23.1	06.6	84	80.7	23.1	44	138.4	39.7	04	196.1	56.2	64	253.7	72.8
25	24.0	06.9	85	81.7	23.4	45	139.4	40.0	05	197.0	56.5	65	254.7	73.0
26	25.0	07.2	86	82.7	23.7	46	140.3	40.2	06	198.0	56.8	66	255.7	73.3
27	26.0	07.4	87	83.6	24.0	47	141.3	40.5	07	199.0	57.0	67	256.6	73.6
28	26.9	07.7	88	84.6	24.3	48	142.2	40.8	08	199.9	57.3	68	257.6	73.9
29	27.9	08.0	89	85.5	24.5	49	143.2	41.1	09	200.9	57.6	69	258.5	74.1
30	28.8	08.3	90	86.5	24.8	50	144.2	41.3	10	201.8	57.9	70	259.5	74.4
31	29.8	08.5	91	87.5	25.1	151	145.1	41.6	211	202.8	58.2	271	260.5	74.7
32	30.8	08.8	92	88.4	25.4	52	146.1	41.9	12	203.8	58.4	72	261.4	75.0
33	31.7	09.1	93	89.4	25.6	53	147.1	42.2	13	204.7	58.7	73	262.4	75.2
34	32.7	09.4	94	90.3	25.9	54	148.0	42.4	14	205.7	59.0	74	263.3	75.5
35	33.6	09.6	95	91.3	26.2	55	149.0	42.7	15	206.6	59.3	75	264.3	75.8
36	34.6	09.9	96	92.3	26.5	56	149.9	43.0	16	207 6	59.5	76	265.3	76.1
37	35.6	10.2	97	93.2	26.7	57	150.9	43.3	17	208.6	59.8	77	266.2	76.3
38	36.5	10.5	98	94.2	27.0	58	151.9	43.5	18	209.5	60.1	78	267.2	76.6
39	37.5	10.7	99	95.2	27.3	59	152.8	43.8	19	210.5	60.4	79	268.2	76.9
40	38.4	11.0	100	96.1	27.6	60	153.8	44.1	20	211.4	60.6	80	269.1	77.2
41	39.4	11.3	101	97.1	27.8	161	154.7	44.4	221	212.4	60.9	281	270.1	77.4
42	40.4	11.6	02	98.0	28.1	62	155.7	44.6	22	213.4	61.2	82	271.0	77.7
43	41.3	11.9	03	99.0	28.4	63	156.7	44.9	23	214.3	61.5	83	272.0	78.0
44	42.3	12.1	04	100.0	28.7	64	157.6	45.2	24	215.3	61.7	84	273.0	78.3
45	43.3	12.4	05	100.9	28.9	65	158.6	45.5	25	216.3	62.0	85	273.9	78.5
46	44.2	12.7	06	101.9	29.2	66	159.5	45.7	26	217.2	62.3	86	274.9	78.8
47	45.2	13.0	07	102.8	29.5	67	160.5	46.0	27	218.2	62.6	87	275.8	79.1
48	46.1	13.2	08	103.8	29.8	68	161.5	46.3	28	219.1	62.8	88	276.8	79.4
49	47.1	13.5	09	104.8	30.0	69	162.4	46.6	29	220.1	63.1	89	277.8	79.6
50	48.1	13.8	10	105.7	30.3	70	163.4	46.9	30	221.1	63.4	90	278.7	79.9
51	49.0	14.1	111	106.7	30.6	171	164.4	47 1	231	222.0	63.7	291	279.7	80.2
52	50.0	14.3	12	107.6	30.9	72	165.3	47.4	32	223.0	63.9	92	280.6	80.5
53	50.9	14.6	13	108.6	31.1	73	166.3	47.7	33	223.9	64.2	93	281.6	80.8
54	51.9	14.9	14	109.6	31.4	74	167.2	48.0	34	224.9	64.5	94	282.6	81.0
55	52.9	15.2	15	110.5	31.7	75	168.2	48.2	35	225.9	64.8	95	283.5	81.3
56	53.8	15.4	16	111.5	32.0	76	169.2	48.5	36	226.8	65.0	96	284.5	81.6
57	54.8	15.7	17	112.5	32.2	77	170.1	48.8	37	227.8	65.3	97	285.5	81.9
58	55.7	16.0	18	113.4	32.5	78	171.1	49.1	38	228.7	65.6	98	286.4	82.1
59	56.7	16.3	19	114.4	32.8	79	172.0	49.3	39	229.7	65.9	99	287.4	82.4
60	57.7	16.5	20	115.3	33.1	80	173.0	49.6	40	230.7	66.1	300	288.3	82.7
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 74 Deg.

Difference of Latitude and Departure for 17 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	01.0	00.3	61	58.3	17.8	121	115.7	35.4	181	173.1	52.9	241	230.5	70.4
2	01.9	00.6	62	59.3	18.1	22	116.7	35.7	82	174.0	53.2	42	231.4	70.7
3	02.9	00.9	63	60.2	18.4	23	117.6	36.0	83	175.0	53.5	43	232.4	71.0
4	03.8	01.2	64	61.2	18.7	24	118.6	36.2	84	175.9	53.8	44	233.3	71.3
5	04.8	01.5	65	62.2	19.0	25	119.5	36.5	85	176.9	54.1	45	234.3	71.6
6	05.7	01.8	66	63.1	19.3	26	120.5	36.8	86	177.9	54.4	46	235.2	71.9
7	06.7	02.0	67	64.1	19.6	27	121.4	37.1	87	178.8	54.7	47	236.2	72.1
8	07.6	02.3	68	65.0	19.9	28	122.4	37.4	88	179.8	55.0	48	237.1	72.4
9	08.6	02.6	69	66.0	20.2	29	123.4	37.7	89	180.7	55.2	49	238.1	72.7
10	09.6	02.9	70	66.9	20.5	30	124.3	38.0	90	181.7	55.5	50	239.1	73.0
11	10.5	03.2	71	67.9	20.8	131	125.3	38.3	191	182.6	55.8	251	240.0	73.3
12	11.5	03.5	72	68.8	21.0	32	126.2	38.6	92	183.6	56.1	52	241.0	73.6
13	12.4	03.8	73	69.8	21.3	33	127.2	38.9	93	184.6	56.4	53	241.9	73.9
14	13.4	04.1	74	70.8	21.6	34	128.1	39.2	94	185.5	56.7	54	242.9	74.1
15	14.3	04.4	75	71.7	21.9	35	129.1	39.5	95	186.5	57.0	55	243.8	74.4
16	15.3	04.7	76	72.7	22.2	36	130.0	39.8	96	187.4	57.3	56	244.8	74.7
17	16.3	05.0	77	73.6	22.5	37	131.0	40.0	97	188.4	57.6	57	245.8	75.0
18	17.2	05.3	78	74.6	22.8	38	132.0	40.3	98	189.3	57.9	58	246.7	75.3
19	18.2	05.6	79	75.5	23.1	39	132.9	40.6	99	190.3	58.2	59	247.7	75.6
20	19.1	05.8	80	76.5	23.4	40	133.9	40.9	200	191.2	58.5	60	248.6	75.9
21	20.1	06.1	81	77.5	23.7	141	134.8	41.2	201	192.2	58.8	261	249.6	76.2
22	21.0	06.4	82	78.4	24.0	42	135.8	41.5	02	193.2	59.0	62	250.5	76.5
23	22.0	06.7	83	79.4	24.3	43	136.7	41.8	03	194.1	59.3	63	251.5	76.8
24	22.9	07.0	84	80.3	24.6	44	137.7	42.1	04	195.1	59.6	64	252.4	77.1
25	23.9	07.3	85	81.3	24.8	45	138.7	42.4	05	196.0	59.9	65	253.4	77.4
26	24.9	07.6	86	82.2	25.1	46	139.6	42.7	06	197.0	60.2	66	254.4	77.7
27	25.8	07.9	87	83.2	25.4	47	140.6	43.0	07	197.9	60.5	67	255.3	77.9
28	26.8	08.2	88	84.1	25.7	48	141.5	43.3	08	198.9	60.8	68	256.3	78.2
29	27.7	08.5	89	85.1	26.0	49	142.5	43.6	09	199.9	61.1	69	257.2	78.5
30	28.7	08.8	90	86.1	26.3	50	143.4	43.8	10	200.8	61.4	70	258.2	78.8
31	29.6	09.1	91	87.0	26.6	151	144.4	44.1	211	201.8	61.7	271	259.1	79.1
32	30.6	09.4	92	88.0	26.9	52	145.3	44.4	12	202.7	62.0	72	260.1	79.4
33	31.6	09.6	93	88.9	27.2	53	146.3	44.7	13	203.7	62.3	73	261.1	79.7
34	32.5	09.9	94	89.9	27.5	54	147.3	45.0	14	204.6	62.6	74	262.0	80.0
35	33.5	10.2	95	90.8	27.8	55	148.2	45.3	15	205.6	62.8	75	263.0	80.3
36	34.4	10.5	96	91.8	28.1	56	149.2	45.6	16	206.5	63.1	76	263.9	80.6
37	35.4	10.8	97	92.8	28.4	57	150.1	45.9	17	207.5	63.4	77	264.9	80.9
38	36.3	11.1	98	93.7	28.6	58	151.1	46.2	18	208.5	63.7	78	265.8	81.2
39	37.3	11.4	99	94.7	28.9	59	152.0	46.5	19	209.5	64.0	79	266.8	81.5
40	38.2	11.7	100	95.6	29.2	60	153.0	46.8	20	210.4	64.3	80	267.7	81.7
41	39.2	12.0	101	96.6	29.5	161	154.0	47.1	221	211.3	64.6	281	268.7	82.0
42	40.2	12.3	02	97.5	29.8	62	154.9	47.4	22	212.3	64.9	82	269.7	82.3
43	41.1	12.6	03	98.5	30.1	63	155.9	47.6	23	213.2	65.2	83	270.6	82.6
44	42.1	12.9	04	99.4	30.4	64	156.8	47.9	24	214.2	65.5	84	271.6	82.9
45	43.0	13.2	05	100.4	30.7	65	157.8	48.2	25	215.2	65.8	85	272.5	83.2
46	44.0	13.4	06	101.4	31.0	66	158.7	48.5	26	216.1	66.1	86	273.5	83.5
47	44.9	13.7	07	102.3	31.3	67	159.7	48.8	27	217.1	66.4	87	274.4	83.8
48	45.9	14.0	08	103.3	31.6	68	160.6	49.1	28	218.0	66.6	88	275.4	84.1
49	46.9	14.3	09	104.2	31.9	69	161.6	49.4	29	219.0	66.9	89	276.4	84.4
50	47.8	14.6	10	105.2	32.2	70	162.6	49.7	30	219.9	67.2	90	277.3	84.7
51	48.8	14.9	111	106.1	32.4	171	163.5	50.0	231	220.9	67.5	291	278.3	85.0
52	49.7	15.2	12	107.1	32.7	72	164.5	50.3	32	221.8	67.8	92	279.2	85.3
53	50.7	15.5	13	108.1	33.0	73	165.4	50.6	33	222.8	68.1	93	280.2	85.5
54	51.6	15.8	14	109.0	33.3	74	166.4	50.9	34	223.8	68.4	94	281.1	85.8
55	52.6	16.1	15	110.0	33.6	75	167.3	51.2	35	224.7	68.7	95	282.1	86.1
56	53.5	16.4	16	110.9	33.9	76	168.3	51.4	36	225.7	69.0	96	283.0	86.4
57	54.5	16.7	17	111.9	34.2	77	169.3	51.7	37	226.6	69.3	97	284.0	86.7
58	55.5	17.0	18	112.8	34.5	78	170.2	52.0	38	227.6	69.6	98	285.0	87.0
59	56.4	17.2	19	113.8	34.8	79	171.2	52.3	39	228.5	69.9	99	285.9	87.5
60	57.4	17.5	20	114.7	35.1	80	172.1	52.6	40	229.5	70.2	300	286.9	87.6
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 73 Deg.

Difference of Latitude and Departure for 18 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	01.0	00.3	61	58.0	18.8	121	115.1	37.4	181	172.1	55.9	241	229.2	74.5
2	02.9	00.6	62	59.0	19.2	22	116.0	37.7	82	173.1	56.2	42	230.1	74.8
3	03 9	00.9	63	59.9	19.5	23	117.0	38.0	83	174.0	56.5	43	231.1	75.1
4	03.8	01.2	64	60.9	19.8	24	117.9	38.3	84	175.0	56.9	44	232.0	75.4
5	04.8	01.5	65	61.8	20.1	25	118.9	38.6	85	175.9	57.2	45	233.0	75.7
6	05.7	01.9	66	62.8	20.4	26	119.8	38.9	86	176.9	57.5	46	233.9	76.0
7	06.7	02.2	67	63.7	20.7	27	120.8	39.2	87	177.8	57.8	47	234.9	76.3
8	07.6	02.5	68	64.7	21.0	28	121.7	39.6	88	178.8	58.1	48	235.8	76.6
9	08.6	02.8	69	65.6	21.3	29	122.7	39.9	89	179.7	58.4	49	236.8	76.9
10	09.5	03.1	70	66.6	21.6	30	123.6	40.2	90	180.7	58.7	50	237.8	77.3
11	10.5	03.4	71	67.5	21.9	131	124.6	40.5	191	181.6	59.0	251	238.7	77.6
12	11.4	03.7	72	68.5	22.2	32	125.5	40.8	92	182.6	59.3	52	239.7	77.9
13	12.3	04.0	73	69.4	22.6	33	126.5	41.1	93	183.5	59.6	53	240.6	78.2
14	13.3	04.3	74	70.4	22.9	34	127.4	41.4	94	184.5	59.9	54	241.6	78.5
15	14.3	04.6	75	71.3	23.2	35	128.4	41.7	95	185.4	60.3	55	242.5	78.8
16	15.2	04.9	76	72.3	23.5	36	129.3	42.0	96	186.4	60.6	56	243.5	79.1
17	16.2	05.3	77	73.2	23.8	37	130.3	42.3	97	187.3	60.9	57	244.4	79.4
18	17.1	05.6	78	74.2	24.1	38	131.2	42.6	98	188.3	61.2	58	245.4	79.7
19	18.1	05.9	79	75.1	24.4	39	132.2	43.0	99	189.2	61.5	59	246.3	80.0
20	19.0	06.2	80	76.1	24.7	40	133.1	43.3	200	190.2	61.8	60	247.3	80.3
21	20.0	06.5	81	77.0	25.0	141	134.1	43.6	201	191.2	62.1	261	248.2	80.6
22	20.9	06.8	82	78.0	25.3	42	135.0	43.9	02	192.1	62.4	62	249.2	81.0
23	21.9	07.1	83	78.9	25.6	43	136.0	44.2	03	193.1	62.7	63	250.1	81.3
24	22.8	07.4	84	79.9	26.0	44	136.9	44.5	04	194.0	63.0	64	251.1	81.6
25	23.8	07.7	85	80.8	26.3	45	137.9	44.8	05	195.0	63.3	65	252.0	81.9
26	24.7	08.0	86	81.8	26.6	46	138.8	45.1	06	195.9	63.7	66	253.0	82.2
27	25.7	08.3	87	82.7	27.9	47	139.8	45.4	07	196.9	64.0	67	253.9	82.5
28	26.6	08.7	88	83.7	27.2	48	140.7	45.7	08	197.8	64.3	68	254.9	82.8
29	27.6	09.0	89	84.6	27.5	49	141.7	46.0	09	198.8	64.6	69	255.8	83.1
30	28.5	09.3	90	85.6	27.8	50	142.7	46.4	10	199.7	64.9	70	256.8	83.4
31	29.5	09.6	91	86.5	28.1	151	143.6	46.7	211	200.7	65.2	271	257.7	83.7
32	30.4	09.9	92	87.5	28.4	52	144.6	47.0	12	201.6	65.5	72	258.7	84.0
33	31.4	10.2	93	88.4	28.7	53	145.5	47.3	13	202.6	65.8	73	259.6	84.4
34	32.3	10.5	94	89.4	29.0	54	146.5	47.6	14	203.5	66.1	74	260.6	84.7
35	33.3	10.8	95	90.3	29.4	55	147.4	47.9	15	204.5	66.4	75	261.5	85.0
36	34.2	11.1	96	91.3	29.7	56	148.4	48.2	16	205.4	66.7	76	262.5	85.3
37	35.2	11.4	97	92.2	30.0	57	149.3	48.5	17	206.4	67.1	77	263.4	85.6
38	36.1	11.7	98	93.2	30.3	58	150.3	48.8	18	207.3	67.4	78	264.4	85.9
39	37.1	12.1	99	94.1	30.6	59	151.2	49.1	19	208.3	67.7	79	265.3	86.2
40	38.0	12.4	100	95.1	30.9	60	152.2	49.4	20	209.2	68.0	80	266.3	86.5
41	39.0	12.7	101	96.1	31.2	161	153.1	49.7	221	210.2	68.3	281	267.2	86.8
42	39.9	13.0	02	97.0	31.5	62	154.1	50.1	22	211.1	68.6	82	268.2	87.1
43	40.9	13.3	03	98.0	31.8	63	155.0	50.4	23	212.1	68.9	83	269.1	87.4
44	41.8	13.6	04	98.9	32.1	64	156.0	50.7	24	213.0	69.2	84	270.1	87.8
45	42.8	13.9	05	99.9	32.4	65	156.9	51.0	25	214.0	69.5	85	271.0	88.1
46	43.7	14.2	06	100.8	32.8	66	157.9	51.3	26	214.9	69.8	86	272.0	88.4
47	44.7	14.5	07	101.8	33.1	67	158.8	51.6	27	215.9	70.1	87	272.9	88.7
48	45.6	14.8	08	102.7	33.4	68	159.8	51.9	28	216.8	70.5	88	273.8	89.0
49	46.6	15.1	09	103.7	33.7	69	160.7	52.2	29	217.8	70.8	89	274.8	89.3
50	47.6	15.5	10	104.6	34.0	70	161.7	52.5	30	218.7	71.1	90	275.8	89.6
51	48.5	15.8	111	105.6	34.3	171	162.6	52.8	231	219.7	71.4	291	276.7	89.9
52	49.5	16.1	12	106.5	34.6	72	163.6	53.1	32	220.6	71.7	92	277.7	90.2
53	50.4	16.4	13	107.5	34.9	73	164.5	53.5	33	221.6	72.0	93	278.6	90.5
54	51.4	16.7	14	108.4	35.2	74	165.5	53.8	34	222.5	72.3	94	279.6	90.8
55	52.3	17.0	15	109.4	35.5	75	166.4	54.1	35	223.5	72.6	95	280.5	91.2
56	53.3	17.3	16	110.3	35.8	76	167.4	54.4	36	224.4	72.9	96	281.5	91.5
57	54.2	17.6	17	111.3	36.2	77	168.3	54.7	37	225.4	73.2	97	282.4	91.8
58	55.2	17.9	18	112.2	36.5	78	169.3	55.0	38	226.3	73.5	98	283.4	92.1
59	56.1	18.2	19	113.2	36.8	79	170.2	55.3	39	227.3	73.9	99	284.3	92.4
60	57.1	18.5	20	114.1	37.1	80	171.2	55.6	40	228.2	74.2	300	285.3	92.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 72 Deg.

Difference of Latitude and Departure for 19 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.3	61	57.7	19.9	121	114.4	39.4	181	171.1	58.9	241	227.9	78.5
2	01.9	00.7	62	58.6	20.2	22	115.3	39.7	82	172.1	59.3	42	228.8	78.8
3	02.8	01.0	63	59.6	20.5	23	116.3	40.0	83	173.0	59.6	43	229.7	79.1
4	03.8	01.3	64	60.5	20.8	24	117.2	40.4	84	174.0	59.9	44	230.7	79.4
5	04.7	01.6	65	61.5	21.2	25	118.2	40.7	85	174.9	60.2	45	231.6	79.8
6	05.7	02.0	66	62.4	21.5	26	119.1	41.0	86	175.9	60.6	46	232.6	80.1
7	06.6	02.3	67	63.3	21.8	27	120.1	41.4	87	176.8	60.9	47	233.5	80.4
8	07.6	02.6	68	64.3	22.1	28	121.0	41.7	88	177.7	61.2	48	234.5	80.7
9	08.5	02.9	69	65.2	22.5	29	122.0	42.0	89	178.7	61.5	49	235.4	81.1
10	09.5	03.3	70	66.2	22.8	30	122.9	42.4	90	179.6	61.8	50	236.4	81.4
11	10.4	03.6	71	67.1	23.1	131	123.9	42.7	191	180.6	62.2	251	237.3	81.7
12	11.3	03.9	72	68.1	23.4	32	124.8	43.0	92	181.5	62.5	52	238.3	82.1
13	12.3	04.2	73	69.0	23.8	33	125.7	43.3	93	182.5	62.8	53	239.2	82.4
14	13.2	04.6	74	70.0	24.1	34	126.7	43.6	94	183.4	63.2	54	240.1	82.7
15	14.2	04.9	75	70.9	24.4	35	127.6	44.0	95	184.4	63.5	55	241.1	83.0
16	15.1	05.2	76	71.9	24.7	36	128.6	44.3	96	185.3	63.8	56	242.0	83.4
17	16.1	05.5	77	72.8	25.1	37	129.5	44.6	97	186.3	64.1	57	243.0	83.7
18	17.0	05.9	78	73.7	25.4	38	130.5	44.9	98	187.2	64.5	58	243.9	84.0
19	18.0	06.2	79	74.7	25.7	39	131.4	45.3	99	188.1	64.8	59	244.9	84.3
20	18.9	06.5	80	75.6	26.0	40	132.4	45.6	200	189.1	65.1	60	245.8	84.7
21	19.9	06.8	81	76.6	26.4	141	133.3	45.9	201	190.0	65.4	261	246.8	85.0
22	20.8	07.2	82	77.5	26.7	42	134.3	46.2	02	191.0	65.8	62	247.7	85.3
23	21.7	07.5	83	78.5	27.0	43	135.2	46.6	03	191.9	66.1	63	248.7	85.6
24	22.7	07.8	84	79.4	27.4	44	136.1	46.9	04	192.9	66.4	64	249.6	86.0
25	23.6	08.1	85	80.4	27.7	45	137.1	47.2	05	193.8	66.7	65	250.5	86.3
26	24.6	08.5	86	81.3	28.0	46	138.0	47.5	06	194.8	67.1	66	251.5	86.6
27	25.5	08.8	87	82.3	28.3	47	139.0	47.9	07	195.7	67.4	67	252.4	86.9
28	26.5	09.1	88	83.2	28.7	48	139.9	48.2	08	196.7	67.7	68	253.4	87.3
29	27.4	09.4	89	84.1	29.0	49	140.9	48.5	09	197.6	68.1	69	254.3	87.6
30	28.4	09.8	90	85.1	29.3	50	141.8	48.8	10	198.5	68.4	70	255.3	87.9
31	29.3	10.1	91	86.0	29.6	151	142.8	49.2	211	199.5	68.7	271	256.2	88.2
32	30.3	10.4	92	87.0	30.0	52	143.7	49.5	12	200.4	69.0	72	257.2	88.6
33	31.2	10.7	93	87.9	30.3	53	144.7	49.8	13	201.4	69.4	73	258.1	88.9
34	32.1	11.1	94	88.9	30.6	54	145.6	50.1	14	202.3	69.7	74	259.1	89.2
35	33.1	11.4	95	89.8	30.9	55	146.5	50.5	15	203.3	70.0	75	260.0	87.5
36	34.0	11.7	96	90.8	31.3	56	147.5	50.8	16	204.2	70.3	76	260.9	89.9
37	35.0	12.0	97	91.7	31.6	57	148.4	51.1	17	205.2	70.7	77	261.9	90.2
38	35.9	12.4	98	92.7	31.9	58	149.4	51.4	18	206.1	71.0	78	262.8	90.5
39	36.9	12.7	99	93.6	32.2	59	150.3	51.8	19	207.1	71.3	79	263.8	90.8
40	37.8	13.0	100	94.5	32.6	60	151.3	52.1	20	208.0	71.6	80	264.7	91.2
41	38.8	13.3	101	95.5	32.9	161	152.2	52.4	221	208.9	72.0	281	265.7	91.5
42	39.7	13.7	02	96.4	33.2	62	153.2	52.7	22	209.9	72.3	82	266.6	91.8
43	40.7	14.0	03	97.4	33.5	63	154.1	53.1	23	210.8	72.6	83	267.6	92.1
44	41.6	14.3	04	98.3	33.9	64	155.1	53.4	24	211.8	72.9	84	268.5	92.5
45	42.5	14.7	05	99.3	34.2	65	156.0	53.7	25	212.7	73.3	85	269.5	92.8
46	43.5	15.0	06	100.2	34.5	66	156.9	54.0	26	213.7	73.6	86	270.4	93.1
47	44.4	15.3	07	101.2	34.8	67	157.9	54.4	27	214.6	73.9	87	271.3	93.4
48	45.4	15.6	08	102.1	35.2	68	158.8	54.7	28	215.6	74.2	88	272.3	93.8
49	46.3	16.0	09	103.1	35.5	69	159.8	55.0	29	216.5	74.6	89	273.2	94.1
50	47.3	16.3	10	104.0	35.8	70	160.7	55.4	30	217.5	74.9	90	274.2	94.4
51	48.2	16.6	111	104.9	36.1	171	161.7	55.7	231	218.4	75.2	291	275.1	94.7
52	49.2	16.9	12	105.9	36.5	72	162.6	56.0	32	219.3	75.5	92	276.1	95.1
53	50.1	17.3	13	106.8	36.8	73	163.6	56.3	33	220.3	75.9	93	277.0	95.4
54	51.1	17.6	14	107.8	37.1	74	164.5	56.7	34	221.2	76.2	94	278.0	95.7
55	52.0	17.9	15	108.7	37.4	75	165.5	57.0	35	222.2	76.5	95	278.9	96.1
56	52.9	18.2	16	109.7	37.8	76	166.4	57.3	36	223.1	76.8	96	279.9	96.4
57	53.9	18.6	17	110.6	38.1	77	167.3	57.6	37	224.1	77.2	97	280.8	96.7
58	54.8	18.9	18	111.6	38.4	78	168.3	58.0	38	225.0	77.5	98	281.7	97.0
59	55.8	19.2	19	112.5	38.7	79	169.2	58.3	39	226.0	77.8	99	282.7	97.4
60	56.7	19.5	20	113.5	39.1	80	170.2	58.6	40	226.9	78.1	300	283.6	97.7
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 71 Deg.

Difference of Latitude and Departure for 20 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.3	61	57.3	20.9	121	113.7	41.4	181	170.1	61.9	241	226.5	82.4
2	01.9	00.7	62	58.3	21.2	22	114.6	41.7	82	171.0	62.2	42	227.4	82.8
3	02.8	01.0	63	59.2	21.5	23	115.6	42.1	83	172.0	62.6	43	228.3	83.1
4	03.8	01.4	64	60.1	21.9	24	116.5	42.4	84	172.9	62.9	44	229.3	83.4
5	04.7	01.7	65	61.1	22.2	25	117.5	42.8	85	173.8	63.3	45	230.2	83.8
6	05.6	02.1	66	62.0	22.6	26	118.4	43.1	86	174.8	63.6	46	231.2	84.1
7	06.6	02.4	67	63.0	22.9	27	119.3	43.4	87	175.7	64.0	47	232.1	84.5
8	07.5	02.7	68	63.9	23.3	28	120.3	43.8	88	176.7	64.3	48	233.0	84.8
9	08.5	03.1	69	64.8	23.6	29	121.2	44.1	89	177.6	64.6	49	234.0	85.2
10	09.4	03.4	70	65.8	23.9	30	122.2	44.5	90	178.5	65.0	50	234.9	85.5
11	10.3	03.8	71	66.7	24.3	131	123.1	44.8	191	179.5	65.3	251	235.9	85.8
12	11.1	04.1	72	67.7	24.6	32	124.0	45.1	92	180.4	65.7	52	236.8	86.2
13	12.2	04.4	73	68.6	25.0	33	125.0	45.5	93	181.4	66.0	53	237.7	86.5
14	13.2	04.8	74	69.5	25.3	34	125.9	45.8	94	182.3	66.3	54	238.7	86.9
15	14.1	05.1	75	70.5	25.7	35	126.9	46.2	95	183.2	66.7	55	239.6	87.2
16	15.0	05.5	76	71.4	26.0	36	127.8	46.5	96	184.2	67.0	56	240.6	87.6
17	16.0	05.8	77	72.4	26.3	37	128.7	46.9	67	185.1	67.4	57	241.5	87.9
18	16.9	06.2	78	73.3	26.7	38	129.7	47.2	98	186.1	67.7	58	242.4	88.2
19	17.9	06.5	79	74.2	27.0	39	130.6	47.5	99	187.0	68.1	59	243.4	88.6
20	18.8	06.8	80	75.2	27.4	40	131.6	47.9	200	187.9	68.4	60	244.3	88.9
21	19.7	07.2	81	76.1	27.7	141	132.5	48.2	201	188.9	68.7	261	245.3	89.3
22	20.7	07.5	82	77.1	28.0	42	133.4	48.6	02	189.8	69.1	62	246.2	89.6
23	21.6	07.9	83	78.0	28.4	43	134.4	48.9	03	190.8	69.4	63	247.1	89.9
24	22.6	08.2	84	78.9	28.7	44	135.3	49.2	04	191.7	69.8	64	248.1	90.3
25	23.5	08.6	85	79.9	29.1	45	136.3	49.6	05	192.6	70.1	65	249.0	90.6
26	24.4	08.9	86	80.8	29.4	46	137.2	49.9	06	193.6	70.5	66	250.0	91.0
27	25.4	09.2	87	81.8	29.8	47	138.1	50.3	07	194.5	70.8	67	250.9	91.3
28	26.3	09.6	88	82.7	30.1	48	139.1	50.6	08	195.5	71.1	68	251.8	91.7
29	27.3	09.9	89	83.6	30.4	49	140.0	51.0	09	196.4	71.5	69	252.8	92.0
30	28.2	10.3	90	84.6	30.8	50	141.0	51.3	10	197.3	71.8	70	253.7	92.3
31	29.1	10.6	91	85.5	31.1	151	141.9	51.6	211	198.3	72.2	271	254.7	92.7
32	30.1	10.9	92	86.5	31.5	52	142.8	52.0	12	199.2	72.5	72	255.6	93.0
33	30.0	11.3	93	87.4	31.8	53	143.8	52.3	13	200.2	72.8	73	256.5	93.4
34	31.9	11.6	94	88.3	32.1	54	144.7	52.7	14	201.1	73.2	74	257.5	93.7
35	32.9	12.0	95	89.3	32.5	55	145.7	53.0	15	202.0	73.5	75	258.4	94.1
36	33.8	12.3	96	90.2	32.8	56	146.6	53.4	16	203.0	73.9	76	259.4	94.4
37	34.8	12.7	97	91.2	33.2	57	147.5	53.7	17	203.9	74.2	77	260.3	94.7
38	35.7	13.0	98	92.1	33.5	58	148.5	54.0	18	204.9	74.6	78	261.2	95.1
39	36.6	13.3	99	93.0	33.9	59	149.4	54.4	19	205.8	74.9	79	262.2	95.4
40	37.6	13.7	100	94.0	34.2	60	150.4	54.7	20	206.7	75.2	80	263.1	95.8
41	38.5	14.0	101	94.9	34.5	161	151.3	55.1	221	207.7	75.6	281	264.1	96.1
42	39.5	14.4	02	95.8	34.9	62	152.2	55.4	22	208.6	75.9	82	265.0	96.4
43	40.4	14.7	03	96.8	35.2	63	153.2	55.7	23	209.6	76.3	83	265.9	96.8
44	41.3	15.0	04	97.7	35.6	64	154.1	56.1	24	210.5	76.6	84	266.9	97.1
45	42.3	15.4	05	98.7	35.9	65	155.1	56.4	25	211.4	77.0	85	267.8	97.5
46	43.2	15.7	06	99.6	36.3	66	156.0	56.8	26	212.4	77.3	86	268.8	97.8
47	44.2	16.1	07	100.5	36.6	67	156.9	57.1	27	213.3	77.6	87	269.7	98.2
48	45.1	16.4	08	101.5	36.9	68	157.9	57.5	28	214.3	78.0	88	270.6	98.5
49	46.0	16.8	09	102.4	37.3	69	158.8	57.8	29	215.2	78.3	89	271.6	98.8
50	47.0	17.1	10	103.4	37.6	70	159.7	58.1	30	216.1	78.7	90	272.5	99.2
51	47.9	17.4	111	104.3	38.0	171	160.7	58.5	231	217.1	79.0	291	273.5	99.5
52	48.9	17.8	12	105.2	38.3	72	161.6	58.8	32	218.0	79.3	92	274.4	99.9
53	49.8	18.1	13	106.2	38.6	73	162.6	59.2	33	219.0	79.7	93	275.3	100.2
54	50.7	18.5	14	107.1	39.0	74	163.5	59.5	34	219.9	80.0	94	276.3	100.5
55	51.7	18.8	15	108.1	39.3	75	164.4	59.9	35	220.8	80.4	95	277.2	100.9
56	52.6	19.2	16	109.0	39.7	76	165.4	60.2	36	221.8	80.7	96	278.2	101.1
57	53.6	19.5	17	109.9	40.0	77	166.3	60.5	37	222.7	81.1	97	279.1	101.6
58	54.5	19.8	18	110.9	40.4	78	167.3	60.9	38	223.6	81.4	98	280.0	101.9
59	55.4	20.2	19	111.8	40.7	79	168.2	61.2	39	224.6	81.7	99	281.0	102.3
60	56.4	20.5	20	112.8	41.0	80	169.1	61.6	40	225.5	82.1	300	281.9	102.6
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 70 Deg.

Difference of Latitude and Departure for 21 Degrees.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.4	61	56.9	21.9	121	113.0	43.4	181	169.0	64.9	241	225.0	86.4
2	01.9	00.7	62	57 9	22.2	22	113.9	43 7	82	169.9	65.2	42	225.9	86.7
3	02.8	01.1	63	58.8	22.6	23	114.9	44.1	83	170.9	65.6	43	226.9	87.1
4	03.7	01.4	64	59.7	22.9	24	115.8	44.4	84	171.8	65.9	44	227.8	87.4
5	04.7	01.8	65	60.7	23.3	25	116.7	44.8	85	172.7	66.3	45	228.7	87.8
6	05.6	02.2	66	61.6	23.7	26	117.7	45.2	86	173.7	66.7	46	229.7	88.2
7	06.5	02.5	67	62.5	24.0	27	118.6	45.5	87	174.6	67.0	47	230.6	88.5
8	07.5	02.9	68	63 5	24.4	28	119.5	45.9	88	175.5	67.4	48	231.5	88.9
9	08.4	03.2	69	64.4	24.7	29	120.5	46.2	89	176.5	67.7	49	232.5	89.2
10	09.3	03.6	70	65.3	25.1	30	121.4	46.6	90	177.4	68.1	50	233.4	89.6
11	10.3	03.9	71	66.3	25.4	131	122.3	47.0	191	178.3	68.5	251	234.3	90.0
12	11.2	04.3	72	67.2	25.8	32	123.3	47.3	92	179.3	68.8	52	235.3	90.3
13	12.1	04.6	73	68.1	26.2	33	124.2	47.7	93	180.2	69.2	53	236.2	90.7
14	13.1	05.0	74	69.1	26.5	34	125.1	48.0	94	181.1	69.5	54	237.1	91.0
15	14.0	05.4	75	70.0	26.9	35	126.1	48.4	95	182.1	69.9	55	238.1	91.4
16	14.9	05.7	76	70.9	26.2	36	127.0	48.7	96	183.0	70.2	56	239.0	91.8
17	15.9	06.1	77	71.9	27.6	37	127.9	49.1	97	183.9	70.6	57	239.9	92.1
18	16.8	06.5	78	72.8	28.0	38	128.9	49.5	98	184.9	71.0	58	240.9	92.5
19	17.7	06.8	79	73.7	28.3	39	129.8	49.8	99	185.8	71.3	59	241.8	92.8
20	18.7	07.2	80	74.7	28.7	40	130.7	50.2	200	186.7	71.7	60	242.7	93.2
21	19.6	07.5	81	75.6	29.0	141	131.7	50.5	201	187.6	72.0	261	243.7	93.5
22	20.5	07.9	82	76.5	29.4	42	132.6	50.9	02	188 6	72.4	62	244.6	93.9
23	21.5	08.2	83	77.5	29.7	43	133.5	51.3	03	189.5	72.8	63	245.5	94.3
24	22.4	08.6	84	78.4	30.1	44	134.5	51.6	04	190.4	73.1	64	246.5	94.6
25	23.3	09.0	85	79.3	30.5	45	135.4	52.0	05	191.4	73.5	65	247.4	95.0
26	24.3	09.3	86	80.3	30.8	46	136.3	52.3	06	192.3	73.8	66	248.3	95.3
27	25.2	09.7	87	81.2	31.2	47	137.3	52.7	07	193.2	74.2	67	249.3	95.7
28	26.1	10.0	88	82.1	31.5	48	138.2	53.0	08	194.2	74.5	68	250.2	96.1
29	27.1	10.4	89	83.1	31.9	49	139.1	53.4	09	195.1	74.9	69	251.1	96.4
30	28.0	10.8	90	84.0	32.3	50	140.1	53.8	10	196.0	75.3	70	252.1	96.8
31	28.9	11.1	91	84.9	32.6	151	141.0	54.1	211	197.0	75.6	271	253.0	97.1
32	29 9	11.5	92	85.9	33.0	52	141.9	54.5	12	197.9	76.0	72	253 9	97.5
33	30.8	11.8	93	86.8	33.3	53	142.9	54.8	13	198.8	76.3	73	254 9	97.8
34	31.7	12.2	94	87.7	33.7	54	143.8	55.2	14	199.8	76.7	74	255.8	98.2
35	32.7	12.5	95	88.7	34.0	55	144.7	55.6	15	200.7	77.1	75	256.7	98.6
36	33.6	12.9	96	89.6	34.4	56	145.7	55.9	16	201.6	77.3	76	257.7	98.9
37	34.5	13.3	97	90.5	34.8	57	146.6	56.3	17	202.6	77.8	77	258.6	99.3
38	35.5	13.6	98	91.5	35.1	58	147.5	56.6	18	203.5	78.1	78	259.5	99.6
39	36.4	14.0	99	92.4	35.5	59	148.5	57.0	19	204.4	78.5	79	260.5	100.0
40	37.3	14.3	100	93.4	35.8	60	149.4	57.3	20	205.4	78.8	80	261.4	100.4
41	38.3	14.7	101	94.3	36.2	161	150.3	57.7	221	206.3	79.2	281	262.3	100.7
42	39 2	15.1	02	95.3	36.6	62	151.3	58.1	22	207.2	79.6	82	263.3	101.1
43	40.1	15.4	03	96.2	36.9	63	152.2	58.4	23	208.2	79.9	83	264.2	101.4
44	41.1	15.8	04	97.1	37.3	64	153.1	58.8	24	209.1	80.3	84	265.1	101.8
45	42.0	16.1	05	98.1	37.6	65	154.1	59.1	25	210.0	80.6	85	266.1	102.1
46	42.9	16.5	06	99.0	38.0	66	155.0	59.5	26	211.0	81.0	86	267.0	102.5
47	43.9	16.8	07	99.9	38.3	67	155.9	59.9	27	211.9	81.4	87	267.9	102.9
48	44.8	17.2	08	100.9	38.7	68	156.9	60.2	28	212.8	81.7	88	268.9	103 2
49	45.7	17.6	09	101.8	39.1	69	157.8	60.6	29	213.8	82.1	89	269.8	103.6
50	46.7	17.9	10	102.7	39.4	70	158.7	60.9	30	214.7	82.4	90	270.7	103.9
51	47.6	18.3	111	103.7	39.8	171	159.7	61.3	231	215.6	82.8	291	271.7	104.3
52	48.5	18.6	12	104.6	40.1	72	160.6	61.6	32	216.6	83.1	92	272.6	104.7
53	49.5	19.0	13	105.5	40.5	73	161.5	62.0	33	217.5	83.5	93	273.5	105.0
54	50.4	19.4	14	106.5	40.9	74	162.5	62.4	34	218.4	83.9	94	274.5	105.4
55	51.3	19.7	15	107.4	41 2	75	163.4	62.7	35	219.4	84.2	95	275.4	105.7
56	52.3	20.1	16	108.3	41.6	76	164.3	63.1	36	220.3	84 6	96	276.3	106.1
57	53.2	20.4	17	109.3	41.9	77	165.3	63.4	37	221.2	84.9	97	277.3	106.4
58	54.1	20.8	18	110.2	42.3	78	166.2	63.8	38	222.2	85 3	98	278.2	106.8
59	55.1	21.1	19	111.1	42.6	79	167.1	64.2	39	223.1	85.7	99	279.1	107.2
60	56.0	21.5	20	112.1	43.0	80	168.1	64.5	40	224.1	86.0	300	280.1	107.5
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 69 Deg.

Difference of Latitude and Departure for 22 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.9	00.4	61	56.6	22.9	121	112.2	45.3	181	167.8	67.8	241	223.5	90.3
2	01.9	00.7	62	57.5	23.2	22	113.1	45.7	82	168.8	68.2	42	224.4	90.7
3	02.8	01.1	63	58.4	23.6	23	114.0	46.1	83	169.7	68.6	43	225.3	91.0
4	03.7	01.5	64	59.3	24.0	24	115.0	46.5	84	170.6	68.9	44	226.2	91.4
5	04.6	01.9	65	60.3	22.3	25	115.9	46.8	85	171.5	69.3	45	227.2	91.8
6	05.6	02.2	66	61.2	24.7	26	116.8	47.2	86	172.5	69.7	46	228.1	92.2
7	06.5	02.6	67	62.1	25.1	27	117.8	47.6	87	173.4	70.1	47	229.0	92.5
8	07.4	03.0	68	63.0	25.5	28	118.7	47.9	88	174.3	70.4	48	229.9	92.9
9	08.3	03.4	69	64.0	25.8	29	119.6	48.3	89	175.2	70.8	49	230.9	93.3
10	09.3	03.7	70	64.9	26.2	30	120.5	48.7	90	176.2	71.2	50	231.8	93.7
11	10.2	04.1	71	65.8	26.6	131	121.5	49.1	191	177.1	71.5	251	232.7	94.0
12	11.1	04.5	72	66.8	27.0	32	122.4	49.4	92	178.0	71.9	52	233.7	94.4
13	12.1	04.9	73	67.7	27.3	33	123.3	49.8	93	178.9	72.3	53	234.6	94.8
14	13.0	05.2	74	68.6	27.7	34	124.2	50.2	94	179.8	72.7	54	235.5	95.2
15	13.9	05.6	75	69.5	28.1	35	125.2	50.6	95	180.8	73.0	55	236.4	95.5
16	14.8	06.0	76	70.5	28.5	36	126.1	50.9	96	181.7	73.4	56	237.4	95.9
17	15.8	06.4	77	71.4	28.8	37	127.0	51.3	97	182.7	73.8	57	238.3	96.3
18	16.7	06.7	78	72.3	29.2	38	128.0	51.7	98	183.6	74.2	58	239.2	96.6
19	17.6	07.1	79	73.2	29.6	39	128.9	52.1	99	184.5	74.5	59	240.1	97.0
20	18.5	07.5	80	74.2	30.0	40	129.8	52.4	200	185.4	74.9	60	241.1	97.4
21	19.5	07.9	81	75.1	30.3	141	130.7	52.8	201	186.4	75.3	261	242.0	97.8
22	20.4	08.2	82	76.0	30.7	42	131.7	53.2	02	187.3	75.7	62	242.9	98.1
23	21.3	08.6	83	77.0	31.1	43	132.6	53.6	03	188.2	76.0	63	243.9	98.5
24	22.3	09.0	84	77.9	31.5	44	133.5	53.9	04	189.1	76.4	64	244.8	98.9
25	23.2	09.4	85	78.8	31.8	45	134.4	54.3	05	190.1	76.8	65	245.7	99.3
26	24.1	09.7	86	79.7	32.2	46	135.4	54.7	06	191.0	77.2	66	246.6	99.6
27	25.0	10.1	87	80.7	32.6	47	136.3	55.1	07	191.9	77.5	67	247.6	100.0
28	26.0	10.5	88	81.6	33.0	48	137.2	55.4	08	192.9	77.9	68	248.5	100.4
29	26.9	10.9	89	82.5	33.3	49	138.2	55.8	09	193.8	78.3	69	249.4	100.8
30	27.8	11.2	90	83.4	33.7	50	139.1	56.2	10	194.7	78.7	70	250.3	101.1
31	28.7	11.6	91	84.4	34.1	151	140.0	56.6	211	195.6	79.0	271	251.3	101.5
32	29.7	12.0	92	85.3	34.5	52	140.9	56.9	12	196.6	79.4	72	252.2	101.9
33	30.6	12.4	93	86.2	34.8	53	141.9	57.3	13	197.5	79.8	73	253.1	102.3
34	31.5	12.7	94	87.2	35.2	54	142.8	57.7	14	198.4	80.2	74	254.1	102.6
35	32.5	13.1	95	88.1	35.6	55	143.7	58.1	15	199.3	80.5	75	255.0	103.0
36	33.4	13.5	96	89.0	36.0	56	144.6	58.4	16	200.3	80.9	76	255.9	103.4
37	34.3	13.9	97	89.9	36.3	57	145.6	58.8	17	201.2	81.3	77	256.8	103.8
38	35.2	14.2	98	90.9	36.7	58	146.5	59.2	18	202.1	81.7	78	257.8	104.1
39	36.2	14.6	99	91.8	37.1	59	147.4	59.6	19	203.1	82.0	79	258.7	104.5
40	37.1	15.0	100	92.7	37.5	60	148.4	59.9	20	204.0	82.4	80	259.6	104.9
41	38.0	15.4	101	93.6	37.8	161	149.3	60.3	221	204.9	82.8	281	260.5	105.3
42	38.9	15.7	02	94.6	38.2	62	150.2	60.7	22	205.8	83.2	82	261.5	105.6
43	39.9	16.1	03	95.5	38.6	63	151.1	61.1	23	206.7	83.5	83	262.4	106.0
44	40.8	16.5	04	96.4	39.0	64	152.1	61.4	24	207.7	83.9	84	263.3	106.4
45	41.7	16.9	05	97.4	39.3	65	153.0	61.8	25	208.6	84.3	85	264.3	106.8
46	42.7	17.2	06	98.3	39.7	66	153.9	62.2	26	209.5	84.7	86	265.2	107.1
47	43.6	17.6	07	99.2	40.1	67	154.8	62.6	27	210.5	85.0	87	266.1	107.5
48	44.5	18.0	08	100.1	40.5	68	155.8	62.9	28	211.4	85.4	88	267.0	107.9
49	45.4	18.4	09	101.1	40.8	69	156.7	63.3	29	212.3	85.8	89	268.0	108.3
50	46.4	18.7	10	102.0	41.2	70	157.6	63.7	30	213.3	86.2	90	268.9	108.6
51	47.3	19.1	111	102.9	41.6	171	158.6	64.1	231	214.2	86.5	291	269.8	109.0
52	48.2	19.5	12	103.8	42.0	72	159.5	64.4	32	215.1	86.9	92	270.7	109.4
53	49.1	19.9	13	104.8	42.3	73	160.4	64.8	33	216.0	87.3	93	271.7	109.8
54	50.1	20.2	14	105.7	42.7	74	161.3	65.2	34	217.0	87.7	94	272.6	110.1
55	51.0	20.6	15	106.6	43.1	75	162.3	65.6	35	217.9	88.0	95	273.5	110.5
56	51.9	21.0	16	107.6	43.5	76	163.2	65.9	36	218.8	88.4	96	274.5	110.9
57	52.9	21.4	17	108.5	43.8	77	164.1	66.3	37	219.7	88.8	97	275.4	111.3
58	53.8	21.7	18	109.4	44.2	78	165.0	66.7	38	220.7	89.2	98	276.3	111.6
59	54.7	22.1	19	110.3	44.6	79	166.0	67.1	39	221.6	89.5	99	277.2	112.0
60	55.6	22.5	20	111.3	45.0	80	166.9	67.4	40	222.5	89.9	300	278.2	112.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 68 Deg.

Difference of Latitude and Departure for 23 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.9	00.4	61	56.1	23.8	121	111.4	47.3	181	166.6	70.7	241	221.8	94.2
2	01.8	00.8	62	57.1	24.2	22	112.3	47.7	82	167.5	71.1	42	222.8	94.5
3	02.8	01.2	63	58.0	24.6	23	113.2	48.1	83	168.5	71.5	43	223.7	94.9
4	03.7	01.6	64	58.9	25.0	24	114.1	48.4	84	169.4	71.9	44	224.6	95.3
5	04.6	02.0	65	59.8	25.4	25	115.1	48.8	85	170.3	72.3	45	225.5	95.7
6	05.5	02.3	66	60.8	25.8	26	116.0	49.2	86	171.2	72.7	46	226.4	96.1
7	06.4	02.7	67	61.7	26.2	27	116.9	49.6	87	172.2	73.1	47	227.4	96.5
8	07.4	03.1	68	62.6	26.6	28	117.8	50.0	88	173.1	73.5	48	228.3	96.9
9	08.3	03.5	69	63.5	27.0	29	118.7	50.4	89	174.0	73.8	49	229.2	97.3
10	09.2	03.9	70	64.4	27.3	30	119.7	50.8	90	174.9	74.2	50	230.1	97.7
11	10.1	04.3	71	65.4	27.7	131	120.6	51.2	191	175.8	74.6	251	231.0	98.1
12	11.0	04.7	72	66.3	28.1	32	121.5	51.6	92	176.7	75.0	52	232.0	98.5
13	12.0	05.1	73	67.2	28.5	33	122.4	52.0	93	177.7	75.4	53	232.9	98.8
14	12.9	05.5	74	68.1	28.9	34	123.3	52.4	94	178.6	75.8	54	233.8	99.2
15	13.8	05.9	75	69.0	29.3	35	124.3	52.7	95	179.5	76.2	55	234.7	99.6
16	14.7	06.3	76	70.0	29.7	36	125.2	53.1	96	180.4	76.6	56	235.6	100.0
17	15.6	06.6	77	70.9	30.1	37	126.1	53.5	97	181.3	77.0	57	236.6	100.3
18	16.6	07.0	78	71.8	30.5	38	127.0	53.9	98	182.3	77.4	58	237.5	100.8
19	17.5	07.4	79	72.7	30.9	39	127.9	54.3	99	183.2	77.7	59	238.4	101.2
20	18.4	07.8	80	73.6	31.3	40	128.9	54.7	200	184.1	78.1	60	239.3	101.6
21	19.3	08.2	81	74.6	31.6	141	129.8	55.1	201	185.0	78.5	261	240.2	102.0
22	20.3	08.6	82	75.5	32.0	42	130.7	55.5	02	185.9	78.9	62	241.2	102.4
23	21.2	09.0	83	76.4	32.4	43	131.6	55.9	03	186.9	79.3	63	242.1	102.8
24	22.1	09.4	84	77.3	32.8	44	132.6	56.3	04	187.8	79.7	64	243.0	103.1
25	23.0	09.8	85	78.2	33.2	45	133.5	56.7	05	188.7	80.1	65	243.9	103.5
26	23.9	10.2	86	79.2	33.6	46	134.4	57.0	06	189.6	80.5	66	244.9	103.9
27	24.9	10.5	87	80.1	34.0	47	135.3	57.4	07	190.5	80.9	67	245.8	104.3
28	25.8	10.9	88	81.0	34.4	48	136.2	57.8	08	191.5	81.3	68	246.7	104.7
29	26.7	11.3	89	81.9	34.8	49	137.2	58.2	09	192.4	81.7	69	247.6	105.1
30	27.6	11.7	90	82.8	35.2	50	138.1	58.6	10	193.3	82.0	70	248.5	105.5
31	28.5	12.1	91	83.8	35.6	151	139.0	59.0	211	194.2	82.4	271	249.5	105.9
32	29.5	12.5	92	84.7	35.9	52	139.9	59.4	12	195.1	82.8	72	250.4	106.3
33	30.4	12.9	93	85.6	36.3	53	140.8	59.8	13	196.1	83.2	73	251.3	106.7
34	31.3	13.3	94	86.5	36.7	54	141.8	60.2	14	197.0	83.6	74	252.2	107.1
35	32.2	13.7	95	87.4	37.1	55	142.7	60.6	15	197.9	84.0	75	253.1	107.4
36	33.1	14.1	96	88.4	37.5	56	143.6	60.9	16	198.8	84.4	76	254.1	107.8
37	34.1	14.5	97	89.3	37.9	57	144.5	61.3	17	199.7	84.8	77	255.0	108.2
38	35.0	14.8	98	90.2	38.3	58	145.4	61.7	18	200.7	85.2	78	255.9	108.6
39	35.9	15.2	99	91.1	38.7	59	146.4	62.1	19	201.6	85.6	79	256.8	109.0
40	36.8	15.6	100	92.0	39.1	60	147.3	62.5	20	202.5	86.0	80	257.7	109.4
41	37.7	16.0	101	93.0	39.5	161	148.2	62.9	221	203.4	86.3	281	258.7	109.8
42	38.7	16.4	02	93.9	39.9	62	149.1	63.3	22	204.4	86.7	82	259.6	110.2
43	39.6	16.8	03	94.8	40.2	63	150.0	63.7	23	205.3	87.1	83	260.5	110.6
44	40.5	17.2	04	95.7	40.6	64	151.0	64.1	24	206.2	87.5	84	261.4	111.0
45	41.4	17.6	05	96.7	41.0	65	151.9	64.5	25	207.1	87.9	85	262.3	111.3
46	42.3	18.0	06	97.6	41.4	66	152.8	64.9	26	208.0	88.3	86	263.3	111.7
47	43.3	18.4	07	98.5	41.8	67	153.7	65.2	27	209.0	88.7	87	264.2	112.1
48	44.2	18.8	08	99.4	42.2	68	154.6	65.6	28	209.9	89.1	88	265.1	112.5
49	45.1	19.1	09	100.3	42.6	69	155.6	66.0	29	210.8	89.5	89	266.0	112.9
50	46.0	19.5	10	101.3	43.0	70	156.5	66.4	30	211.7	89.9	90	266.9	113.3
51	46.9	19.9	111	102.2	43.4	171	157.4	66.8	231	212.6	90.3	291	267.9	113.7
52	47.9	20.3	12	103.1	43.8	72	158.3	67.2	32	213.6	90.6	92	268.8	114.1
53	48.8	20.7	13	104.0	44.1	73	159.2	67.6	33	214.5	91.0	93	269.7	114.5
54	49.7	21.1	14	104.9	44.5	74	160.2	68.0	34	215.4	91.4	94	270.6	114.9
55	50.6	21.5	15	105.9	44.9	75	161.1	68.4	35	216.3	91.8	95	271.5	115.3
56	51.5	21.9	16	106.8	45.3	76	162.0	68.8	36	217.2	92.2	96	272.5	115.6
57	52.5	22.3	17	107.7	45.7	77	162.9	69.2	37	218.2	92.6	97	273.4	116.0
58	53.4	22.7	18	108.6	46.1	78	163.8	69.5	38	219.1	93.0	98	274.3	116.4
59	54.3	23.1	19	109.5	46.5	79	164.8	69.9	39	220.0	93.4	99	275.2	116.8
60	55.2	23.4	20	110.5	46.9	80	165.7	70.3	40	220.0	93.8	300	276.2	117.2
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 67 Deg.

Difference of Latitude and Departure for 24 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	61	55.7	24.8	121	110.5	49.2	181	165.3	73.6	241	220.2	98.0
2	01.8	00.8	62	56.6	25.2	22	111.4	49.6	82	166.3	74.0	42	221.1	98.4
3	02.7	01.2	63	57.6	25.6	23	112.4	50.0	83	167.2	74.4	43	222.0	98.8
4	03.7	01.6	64	58.5	26.0	24	113.3	50.4	84	168.1	74.8	44	222.9	99.2
5	04.6	02.0	65	59.4	26.4	25	114.2	50.8	85	169.0	75.2	45	223.8	99.6
6	05.5	02.4	66	60.3	26.8	26	115.1	51.2	86	160.9	75.6	46	224.7	100.0
7	06.4	02.8	67	61.2	27.2	27	116.0	51.7	87	170.8	76.1	47	225.6	100.5
8	07.3	03.3	68	62.1	27.7	28	116.9	52.1	88	171.7	76.5	48	226.5	100.9
9	08.2	03.7	69	63.0	28.1	29	117.8	52.5	89	172.7	76.9	49	227.5	101.3
10	09.1	04.1	70	63.9	28.5	30	118.8	52.9	90	173.6	77.3	50	228.4	101.7
11	10.0	04.5	71	64.9	28.9	131	119.7	53.3	191	174.5	77.7	251	229.3	102.1
12	11.0	04.9	72	65.8	20.3	32	120.6	53.7	92	175.4	78.1	52	230.2	102.5
13	11.9	05.3	73	66.7	29.7	33	121.5	54.1	93	176.3	78.5	53	231.1	102.9
14	12.8	05.7	74	67.6	30.1	34	122.4	54.5	94	177.2	78.9	54	232.0	103.3
15	13.7	06.1	75	68.5	30.5	35	123.3	54.9	95	178.1	79.3	55	232.9	103.7
16	14.6	06.5	76	69.4	30.9	36	124.2	55.3	96	179.0	79.7	56	233.9	104.1
17	15.5	06.9	77	70.3	31.3	37	125.1	55.7	97	180.0	80.1	57	234.8	104.5
18	16.4	07.3	78	71.3	31.7	38	126.1	56.2	98	180.9	80.5	58	235.7	104.9
19	17.4	07.7	79	72.2	32.1	39	127.0	56.5	99	181.8	80.9	59	236.6	105.3
20	18.3	08.1	80	73.1	32.5	40	127.9	56.9	200	182.7	81.3	60	237.5	105.7
21	19.2	08.5	81	74.0	32.9	141	128.8	57.3	201	183.6	81.7	261	238.4	106.1
22	20.1	08.9	82	74.9	33.3	42	129.7	57.8	02	184.5	82.2	62	239.3	106.6
23	21.0	09.4	83	75.8	33.8	43	130.6	58.2	03	185.4	82.6	63	240.3	107.0
24	21.9	09.8	84	76.7	34.2	44	131.5	58.6	04	186.4	83.0	64	241.2	107.4
25	22.8	10.2	85	77.6	34.6	45	132.5	59.0	05	187.3	83.4	65	242.1	107.8
26	23.8	10.6	86	78.6	35.0	46	133.4	59.4	06	188.2	83.8	66	243.0	108.2
27	24.7	11.0	87	79.5	35.4	47	134.3	59.8	07	189.1	84.2	67	243.9	108.6
28	25.6	11.4	88	80.4	35.8	48	135.2	60.2	08	190.0	84.6	68	244.8	109.0
29	26.5	11.8	89	81.3	36.2	49	136.1	60.6	09	190.9	85.0	69	245.7	109.4
30	27.4	12.2	90	82.2	36.6	50	137.0	61.0	10	191.8	85.4	70	246.6	109.8
31	28.3	12.6	91	83.1	37.0	151	137.9	61.4	211	192.7	85.8	271	247.6	110.2
32	29.2	13.0	92	84.0	37.4	52	138.9	61.8	12	193.7	86.2	72	248.5	110.6
33	30.1	13.4	93	85.0	37.8	53	139.8	62.2	13	194.6	86.6	73	249.4	111.0
34	31.1	13.8	94	85.9	38.2	54	140.7	62.6	14	195.5	87.0	74	250.3	111.4
35	32.0	14.2	95	86.8	38.6	55	141.6	63.0	15	196.4	87.4	75	251.2	111.8
36	32.9	14.6	96	87.7	39.0	56	142.5	63.4	17	197.3	87.8	76	252.1	112.2
37	33.8	15.0	97	88.6	39.4	57	143.4	63.9	16	198.2	88.3	77	253.0	112.7
38	34.7	15.5	98	89.5	39.9	58	144.3	64.3	18	199.1	88.7	78	254.0	113.1
39	35.6	15.9	99	90.4	40.3	59	145.2	64.7	19	200.1	89.1	79	254.9	113.5
40	36.5	16.3	100	91.4	40.7	60	146.2	65.1	20	201.0	89.5	80	255.8	113.9
41	37.5	16.7	101	92.3	41.1	161	147.1	65.5	221	201.9	89.9	281	256.7	114.3
42	38.4	17.1	02	93.2	41.5	62	148.0	65.9	22	202.8	90.3	82	257.6	114.7
43	39.3	17.5	03	94.1	41.9	63	148.9	66.3	23	203.7	90.7	83	258.5	115.1
44	40.2	17.9	04	95.0	42.3	64	149.8	66.7	24	204.6	91.1	84	259.4	115.5
45	41.1	18.3	05	95.9	42.7	65	150.7	67.1	25	205.5	91.5	85	260.3	115.9
46	42.0	18.7	06	96.8	43.1	66	151.6	67.5	26	206.5	91.9	86	261.3	116.3
47	42.9	19.1	07	97.7	43.5	67	152.6	67.9	27	207.4	92.3	87	262.2	116.7
48	43.8	19.5	08	98.7	43.9	68	153.5	68.3	28	208.3	92.7	88	263.1	117.1
49	44.8	19.9	09	99.6	44.3	69	154.4	68.7	29	209.2	93.1	89	264.0	117.5
50	45.7	20.3	10	100.5	44.7	70	155.3	69.1	30	210.1	93.5	90	264.9	117.9
51	46.6	20.7	111	101.4	45.1	171	156.2	69.5	231	211.0	93.9	291	265.8	118.3
52	47.5	21.1	12	102.3	45.6	72	157.1	70.0	32	211.9	94.4	92	266.7	118.8
53	48.4	21.6	13	103.2	46.0	73	158.0	70.4	33	212.8	94.8	93	267.7	119.2
54	49.3	22.0	14	104.1	46.4	74	158.9	70.8	34	213.8	95.2	94	268.6	119.6
55	50.2	22.4	15	105.1	46.8	75	159.9	71.2	35	214.7	95.6	95	269.5	120.0
56	51.2	22.8	16	106.0	47.6	76	160.8	71.6	36	215.6	96.0	96	270.4	120.4
57	52.1	23.2	17	106.9	47.6	77	161.7	72.0	37	216.5	96.4	97	271.3	120.8
58	53.0	23.6	18	107.8	48.0	78	162.6	72.4	38	217.4	96.8	98	272.2	121.2
59	53.9	24.0	19	108.7	48.4	79	163.5	72.8	39	218.3	97.2	99	273.1	121.6
60	54.8	24.4	20	109.6	48.8	80	164.4	73.2	40	219.2	97.6	300	274.1	122.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 66 Deg.

Difference of Latitude and Departure for 25 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.9	00.4	61	55.3	25.8	121	109.7	51.1	181	164.0	76.5	241	218.4	101.8
2	01.8	00.8	62	56.2	26.2	22	110.6	51.6	82	164.9	76.9	42	219.3	102.3
3	02.7	01.3	63	57.1	26.6	23	111.5	52.0	83	165.9	77.3	43	220.2	102.7
4	03.6	01.7	64	58.0	27.0	24	112.4	52.4	84	166.8	77.8	44	221.1	103.1
5	04.5	02.1	65	58.9	27.5	25	113.3	52.8	85	167.7	78.2	45	222.0	103.5
6	05.4	02.5	66	59.8	27.9	26	114.2	53.2	86	168.6	78.6	46	222.9	104.0
7	06.3	03.0	67	60.7	28.3	27	115.1	53.7	87	169.5	79.0	47	223.9	104.4
8	07.3	03.4	68	61.6	28.7	28	116.0	54.1	88	170.4	79.4	48	224.8	104.8
9	08.2	03.8	69	62.5	29.2	29	116.9	54.5	89	171.3	79.9	49	225.7	105.2
10	09.1	04.2	70	63.4	29.6	30	117.8	54.9	90	172.2	80.3	50	226.6	105.7
11	10.0	04.6	71	64.3	30.0	131	118.7	55.4	191	173.1	80.7	251	227.5	106.1
12	10.9	05.0	72	65.3	30.4	32	119.6	55.8	92	174.0	81.1	52	228.4	106.5
13	11.8	05.5	73	66.2	30.8	33	120.5	56.2	93	174.9	81.6	53	229.3	106.9
14	12.7	05.9	74	67.1	31.3	34	121.4	56.6	94	175.8	82.0	54	230.2	107.3
15	13.6	06.3	75	68.0	31.7	35	122.4	57.6	95	176.7	82.4	55	231.1	107.8
16	14.5	06.8	76	68.9	32.1	36	123.3	57.5	96	177.6	82.8	56	232.0	108.2
17	15.4	07.2	77	69.8	32.5	37	124.2	57.9	97	178.5	83.3	57	232.9	108.6
18	16.3	07.6	78	70.7	33.0	38	125.1	58.3	98	179.4	83.7	58	233.8	109.0
19	17.2	08.0	79	71.6	33.4	39	126.0	58.7	99	180.4	84.1	59	234.7	109.5
20	18.1	08.5	80	72.5	33.8	40	126.9	59.2	200	181.3	84.5	60	235.6	109.9
21	19.0	08.9	81	73.4	34.2	141	127.8	59.6	201	182.2	84.9	261	236.5	110.3
22	19.9	09.3	82	74.3	34.7	42	128.7	60.0	02	183.1	85.4	62	237.5	110.7
23	20.8	09.7	83	75.2	35.1	43	129.6	60.4	03	184.0	85.8	63	238.4	111.1
24	21.8	10.1	84	76.1	35.5	44	130.5	60.9	04	184.9	86.2	64	239.3	111.6
25	22.7	10.6	85	77.0	35.9	45	131.4	61.3	05	185.8	86.6	65	240.2	112.0
26	23.6	11.0	86	77.9	36.3	46	132.3	61.7	06	186.7	87.1	66	241.1	112.4
27	24.5	11.4	87	78.8	36.8	47	133.2	62.1	07	187.6	87.5	67	242.0	112.8
28	25.4	11.8	88	79.8	37.2	48	134.1	62.5	08	188.5	87.9	68	242.9	113.3
29	26.3	12.3	89	80.7	37.6	49	135.0	63.0	09	189.4	88.3	69	243.8	113.7
30	27.2	12.7	90	81.6	38.0	50	135.9	63.4	10	190.3	88.7	70	244.7	114.1
31	28.1	13.1	91	82.5	38.5	151	136.9	63.8	211	191.2	89.2	271	245.6	114.5
32	29.0	13.5	92	83.4	38.9	52	137.8	64.2	12	192.1	89.6	72	246.5	114.9
33	29.9	13.9	93	84.3	39.3	53	138.7	64.7	13	193.0	90.0	73	247.4	115.4
34	30.8	14.4	94	85.2	39.7	54	139.6	65.1	14	193.9	90.4	74	248.3	115.8
35	31.7	14.8	95	86.1	40.1	55	140.5	65.5	15	194.9	90.9	75	249.2	116.2
36	32.6	15.2	96	87.0	40.6	56	141.4	65.9	16	195.8	91.3	76	250.1	116.6
37	33.5	15.6	97	87.9	41.0	57	142.3	66.3	17	196.7	91.7	77	251.0	117.1
38	34.4	16.1	98	88.8	41.4	58	143.2	66.8	18	197.6	92.1	78	252.0	117.5
39	35.3	16.5	99	89.7	41.8	59	144.1	67.2	19	198.5	92.5	79	252.9	117.9
40	36.3	16.9	100	90.6	42.3	60	145.0	67.6	20	199.4	93.0	80	253.8	118.3
41	37.2	17.3	101	91.5	42.7	161	145.9	68.0	221	200.3	93.4	281	254.7	118.8
42	38.1	17.7	02	92.4	43.1	62	146.8	68.5	22	201.2	93.8	82	255.6	119.2
43	39.0	18.2	03	93.3	43.5	63	147.7	68.9	23	202.1	94.2	83	256.5	119.6
44	39.9	18.6	04	94.3	44.0	64	148.6	69.3	24	203.0	94.7	84	257.4	120.0
45	40.8	19.0	05	95.2	44.4	65	149.5	69.7	25	203.9	95.1	85	258.3	120.4
46	41.7	19.4	06	96.1	44.8	66	150.4	70.2	26	204.8	95.5	86	259.2	120.9
47	42.6	19.9	07	97.0	45.2	67	151.4	70.6	27	205.7	95.9	87	260.1	121.3
48	43.5	20.3	08	97.9	45.6	68	152.3	71.0	28	206.6	96.4	88	261.0	121.7
49	44.4	20.7	09	98.8	46.1	69	153.2	71.4	29	207.5	96.8	89	261.9	122.1
50	45.3	21.1	10	99.7	46.5	70	154.1	71.8	30	208.4	97.2	90	262.8	122.6
51	46.2	21.6	111	100.6	46.9	171	155.0	72.3	231	209.4	97.6	291	263.7	123.0
52	47.1	22.0	12	101.5	47.3	72	155.9	72.7	32	210.3	98.0	92	264.6	123.4
53	48.0	22.4	13	102.4	47.8	73	156.8	73.1	33	211.2	98.5	93	265.5	123.8
54	49.6	22.8	14	103.3	48.2	74	157.7	73.5	34	212.1	98.9	94	266.5	124.2
55	50.8	23.2	15	104.2	48.6	75	158.6	74.0	35	213.0	99.3	95	267.4	124.7
56	51.8	23.7	16	105.1	49.0	76	159.5	74.4	36	213.9	99.7	96	268.3	125.1
57	48.7	24.1	17	106.0	49.4	77	160.4	74.8	37	214.8	100.2	97	269.2	125.5
58	52.7	24.5	18	106.9	49.9	78	161.3	75.2	38	215.7	100.6	98	270.1	125.9
59	53.5	24.9	19	107.8	50.3	79	162.2	75.6	39	216.6	101.0	99	271.0	126.4
60	54.4	25.4	20	108.8	50.7	80	163.1	76.1	40	217.5	101.4	300	271.9	126.8
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 65 Deg.

Difference of Latitude and Departure for 26 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.9	00.4	61	54.8	26.7	121	108.8	53.0	181	162.7	79.4	241	216.6	105.7
2	01.8	00.9	62	55.7	27.2	22	109.7	53.5	82	163.6	79.8	42	217.5	106.1
3	02.7	01.3	63	56.6	27.6	23	110.6	53.9	83	164.5	80.2	43	218.4	106.5
4	03.6	01.8	64	57.5	28.1	24	111.5	54.4	84	165.4	80.7	44	219.3	107.0
5	04.5	02.2	65	58.4	28.5	25	112.4	54.8	85	166.3	81.1	45	220.2	107.4
6	05.4	02.6	66	59.3	28.9	26	113.2	55.2	86	167.2	81.5	46	221.1	107.8
7	06.3	03.1	67	60.2	29.4	27	114.1	55.7	87	168.1	82.0	47	222.0	108.3
8	07.2	03.5	68	61.1	29.8	28	115.0	56.1	88	169.0	82.4	48	222.9	108.7
9	08.1	03.9	69	62.0	30.2	29	115.9	56.6	89	169.9	82.9	49	223.8	109.2
10	09.0	04.4	70	62.9	30.7	30	116.8	57.0	90	170.8	83.3	50	224.7	109.6
11	09.9	04.8	71	63.8	31.1	131	117.7	57.4	191	171.7	83.7	251	225.6	110.0
12	10.8	05.3	72	64.7	31.6	32	118,6	57.9	92	172.6	84.2	52	226.5	110.5
13	11.7	05.7	73	65.6	32.0	33	119.5	58.3	93	173.5	84.6	53	227.4	110.9
14	12.6	06.1	74	66.5	32.4	34	120.4	58.7	94	174.4	85.0	54	228.3	111.4
15	13.5	06.6	75	67.4	32.9	35	121.3	59.2	95	175.3	85.5	55	229.2	111.8
16	14.4	07.0	76	68.3	33.3	36	122.2	59.6	96	176.2	85.9	56	230.1	112.2
17	15.3	07.5	77	69.2	33.8	37	123.1	60.1	97	177.1	86.4	57	231.0	112.7
18	16.2	07.9	78	70.1	34.2	38	124.0	60.5	98	178.0	86.8	58	231.9	113.1
19	17.1	08.3	79	71.0	34.6	39	124.9	60.9	99	178.9	87.2	59	232.8	113.5
20	18.0	08.7	80	71.9	35.1	40	125.8	61.4	200	179.8	87.7	60	233.7	114.0
21	18.9	09.2	81	72.8	35.5	141	126.7	61.8	201	180.7	88.1	261	234.6	114.4
22	19.8	09.6	82	73.7	35.9	42	127.6	62.3	02	181.6	88.6	62	235.5	114.9
23	20.7	10.1	83	74.6	36.4	43	128.5	62.7	03	182.5	89.0	63	236.4	115.3
24	21.6	10.5	84	75.5	36.8	44	129.4	63.1	04	183.4	89.4	64	237.3	115.7
25	22.5	11.0	85	76.4	37.3	45	130.3	63.6	05	184.3	89.9	65	238.2	116.2
26	23.4	11.4	86	77.3	37.7	46	131.2	64.0	06	185.2	90.3	66	239.1	116.6
27	24.3	11.8	87	78.2	38.1	47	132.1	64.4	07	186.1	90.7	67	240.0	117.1
28	25.2	12.3	88	79.1	38.6	48	133.0	64.9	08	187.0	91.2	68	240.9	117.5
29	26.1	12.7	89	80.0	39.0	49	133.9	65.3	09	187.8	91.6	69	241.8	117.9
30	27.0	13.2	90	80.9	39.5	50	134.8	65.8	10	188.7	92.1	70	242.7	118.4
31	27.9	13.6	91	81.8	39.9	151	135.7	66.2	211	189.6	92.5	271	243.6	118.8
32	28.8	14.0	92	82.7	40.3	52	136.6	66.6	12	190.5	92.9	72	244.5	119.2
33	29.7	14.5	93	83.6	40.8	53	137.5	67.1	13	191.4	93.4	73	245.4	119.7
34	30.6	14.9	94	84.5	41.2	54	138.4	67.5	14	192.3	93.8	74	246.3	120.1
35	31.5	15.3	95	85.4	41.6	55	139.3	68.0	15	193.2	94.3	75	247.2	120.6
36	32.4	15.8	96	86.3	42.1	56	140.2	68.4	16	194.1	94.7	76	248.1	121.0
37	33.3	16.2	97	87.2	42.5	57	141.1	68.8	17	195.0	95.1	77	249.0	121.4
38	34.2	16.7	98	88.1	43.0	58	142.0	69.3	18	195.9	95.6	78	249.9	121.9
39	35.1	17.1	99	89.0	43.4	59	142.9	69.7	19	196.8	96.0	79	250.8	122.3
40	36.0	17.5	100	89.9	43.8	60	143.8	70.1	20	197.7	96.4	80	251.7	122.8
41	36.9	18.0	101	90.8	44.3	161	144.7	70.6	221	198.6	96.9	281	252.6	123.2
42	37.7	18.4	02	91.7	44.7	62	145.6	71.0	22	199.5	97.3	82	253.5	123.6
43	38.6	18.9	03	92.6	45.2	63	146.5	71.5	23	200.4	97.8	83	254.4	124.1
44	39.5	19.3	04	93.5	45.6	64	147.4	71.9	24	201.3	98.2	84	255.3	124.5
45	40.4	19.7	05	94.4	46.0	65	148.3	72.3	25	202.2	98.6	85	256.2	124.9
46	41.3	20,2	06	95.3	46.5	66	149.2	72.8	26	203.1	99.1	86	257.1	125.4
47	42.2	20.6	07	96.2	46.9	67	150.1	73.2	27	204.0	99.5	87	258.0	125.8
48	43.1	21.0	08	97.1	47.3	68	151.0	73.7	28	204.9	100.0	88	258.9	126.3
49	44.0	21.5	09	98.0	47.8	69	151.9	74.1	29	205.8	100.4	89	259.8	126.7
50	44.9	21.9	10	98.9	48.2	70	152.8	74.5	30	206.7	100.8	90	260.7	127.1
51	45.8	22.4	111	99.8	48.7	171	153.7	75.0	231	207.6	101.3	291	261.6	127.6
52	46.7	22.8	12	100.7	49.1	72	154.6	75.4	32	208.5	101.7	92	262.4	128.0
53	47.6	23.2	13	101.6	49.5	73	155.5	75.8	33	209.4	102.1	93	263.3	128.5
54	48.5	23.7	14	102.5	50.0	74	156.4	76.3	34	210.3	102.6	94	264.2	128.9
55	49.4	24.1	15	103.4	50.4	75	157.3	76.7	35	211.2	103.0	95	265.1	129.3
56	50.3	24.6	16	104.3	50.9	76	158.2	77.2	36	212.1	103.5	96	266.0	129.8
57	51.2	25.0	17	105.2	51.3	77	159.1	77.6	37	213.0	103.9	97	266.9	130.2
58	52.1	25.4	18	106.1	51.7	78	160.0	78.0	38	213.9	104.3	98	267.8	130.6
59	53.0	25.9	19	107.0	52.2	79	160.9	78.5	39	214.8	104.8	99	268.7	131.1
60	53.9	26.3	20	107.9	52.6	80	161.8	78.9	40	215.7	105.2	300	269.6	131.5
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 64 Deg.

Difference of Latitude and Departure for 27 Degrees.

Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep	Dift	Lat	Dep
1	00.9	00.5	61	54.4	27.7	121	107.8	54.9	181	161.3	82.2	241	214.7	109.4
2	01.8	00.9	62	55.2	28.1	22	108.7	55.4	82	162.2	82.6	42	215.6	109.9
3	02.7	01.4	63	56.1	28.6	23	109.6	55.8	83	163.1	83.1	43	216.5	110.3
4	03.6	01.8	64	57.0	29.1	24	110.5	56.3	84	163.9	83.5	44	217.4	110.8
5	04.5	02.3	65	57.9	29.5	25	111.4	56.8	85	164.8	84.0	45	218.3	111.2
6	05.3	02.7	66	58.8	30.0	26	112.3	57.2	86	165.7	84.4	46	219.2	111.7
7	06.2	03.2	67	59.7	30.4	27	113.2	57.7	87	166.6	84.9	47	220.1	112.1
8	07.1	03.6	68	60.6	30.9	28	114.0	58.1	88	167.5	85.4	48	221.0	112.6
9	08.0	04.1	69	61.5	31.3	29	114.9	58.6	89	168.4	85.8	49	221.9	113.0
10	08.9	04.5	70	62.4	31.8	30	115.8	59.0	90	169.3	86.3	50	222.8	113.5
11	09.8	05.0	71	63.3	32.2	131	116.7	59.5	191	170.2	86.7	251	223.6	114.0
12	10.7	05.4	72	64.2	32.7	32	117.6	59.9	92	171.1	87.2	52	224.5	114.4
13	11.6	05.9	73	65.0	33.1	33	118.5	60.4	93	172.0	87.6	53	225.4	114.9
14	12.5	06.4	74	65.9	33.6	34	119.4	60.8	94	172.9	88.1	54	226.3	115.3
15	13.4	06.8	75	66.8	34.1	35	120.3	61.3	95	173.7	88.5	55	227.2	115.8
16	14.3	07.3	76	67.7	34.5	36	121.2	61.7	96	174.6	89.0	56	228.1	116.2
17	15.1	07.7	77	68.6	35.0	37	122.1	62.2	97	175.5	89.4	57	229.0	116.7
18	16.0	08.2	78	69.5	35.4	38	123.0	62.7	98	176.4	89.9	58	229.9	117.1
19	16.9	08.6	79	70.4	35.9	39	123.8	63.1	99	177.3	90.3	59	230.8	117.6
20	17.8	09.1	80	71.3	36.3	40	124.7	63.6	200	178.2	90.8	60	231.7	118.0
21	18.7	09.5	81	72.2	36.8	141	125.6	64.0	201	179.1	91.3	261	232.6	118.5
22	19.6	10.0	82	73.1	37.2	42	126.5	64.5	02	180.0	91.7	62	233.4	118.9
23	20.5	10.4	83	74.0	37.7	43	127.4	64.9	03	180.9	92.2	63	234.3	119.4
24	21.4	10.9	84	74.8	38.1	44	128.3	65.4	04	181.8	92.6	64	235.2	119.9
25	22.3	11.4	85	75.7	38.6	45	129.2	65.8	05	182.7	93.1	65	236.1	120.3
26	23.2	11.8	86	76.6	39.0	46	130.1	66.3	06	183.5	93.5	66	237.0	120.8
27	24.1	12.3	87	77.5	39.5	47	131.0	66.7	07	184.4	94.0	67	237.9	121.2
28	24.9	12.7	88	78.4	40.0	48	131.9	67.2	08	185.3	94.4	68	238.8	121.7
29	25.8	13.2	89	79.3	40.4	49	132.8	67.6	09	186.2	94.9	69	239.7	122.1
30	26.7	13.6	90	80.2	40.9	50	133.7	68.1	10	187.1	95.3	70	240.6	122.6
31	27.6	14.3	91	81.1	41.2	151	134.5	68.6	211	188.0	95.8	271	241.5	123.3
32	28.5	14.5	92	82.0	41.8	52	135.4	69.0	12	188.9	96.2	72	242.4	123.5
33	29.4	15.0	93	82.9	42.2	53	136.3	69.5	13	189.8	96.7	73	243.2	123.9
34	30.3	15.4	94	83.8	42.7	54	137.2	69.9	14	190.7	97.2	74	244.1	124.4
35	31.2	15.9	95	84.6	43.1	55	138.1	70.4	15	191.6	97.6	75	245.0	124.9
36	32.1	16.3	96	85.5	43.6	56	139.0	70.8	16	192.5	98.1	76	245.9	125.3
37	33.0	16.8	97	86.4	44.0	57	139.9	71.3	17	193.3	98.5	77	246.8	125.8
38	33.9	17.3	98	87.3	44.5	58	140.8	71.7	18	194.2	99.0	78	247.7	126.2
39	34.7	17.7	99	88.2	44.9	59	141.7	72.2	19	195.1	99.4	79	248.6	126.7
40	35.6	18.2	100	89.1	45.4	60	142.6	72.6	20	196.0	99.9	80	249.5	127.1
41	36.5	18.6	101	90.0	45.9	161	143.5	73.1	221	196.9	100.3	281	250.4	127.6
42	37.4	19.1	02	90.9	46.3	62	144.3	73.5	22	197.8	100.8	82	251.3	128.0
43	38.3	19.5	03	91.8	46.8	63	145.2	74.0	23	198.7	101.2	83	252.2	128.5
44	39.2	20.0	04	91.7	47.2	64	146.1	74.5	24	199.6	101.7	84	253.0	128.9
45	40.1	20.4	05	93.6	47.7	65	147.0	74.9	25	200.5	102.2	85	253.9	129.4
46	41.0	20.9	06	94.4	48.1	66	147.9	75.4	26	201.4	102.6	86	254.8	129.8
47	41.9	21.3	07	95.3	48.6	67	148.8	75.8	27	202.3	103.1	87	255.7	130.3
48	42.8	21.8	08	96.2	49.0	68	149.7	76.3	28	203.1	103.5	88	256.6	130.8
49	43.7	22.2	09	97.1	49.5	69	150.6	76.7	29	204.0	104.0	89	257.5	131.2
50	44.6	22.7	10	98.0	49.9	70	151.5	77.2	30	204.9	104.4	90	258.4	131.7
51	45.4	23.2	111	98.9	50.4	171	152.4	77.6	231	205.8	104.9	291	259.3	132.1
52	46.3	23.6	12	99.8	50.8	72	153.3	78.1	32	206.7	105.3	92	260.2	132.6
53	47.2	24.1	13	100.7	51.3	73	154.1	78.5	33	207.6	105.8	93	261.1	133.0
54	48.1	24.5	14	101.6	51.8	74	155.0	79.0	34	208.5	106.2	94	262.0	133.5
55	49.0	25.0	15	102.5	52.2	75	155.9	79.5	35	209.4	106.7	95	262.8	133.9
56	49.9	25.4	16	103.4	52.7	76	156.8	79.9	36	210.3	107.1	96	263.7	134.4
57	50.8	25.9	17	104.2	53.1	77	157.7	80.4	37	211.2	107.6	97	264.6	134.8
58	51.7	26.3	18	105.1	53.6	78	158.6	80.8	38	212.1	108.1	98	265.5	135.3
59	52.6	26.8	19	106.6	54.0	79	159.5	81.3	39	212.9	108.5	99	266.4	135.7
60	53.5	27.2	20	106.9	54.5	80	160.4	81.7	40	213.8	109.0	300	267.3	136.2
Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat	Dift	Dep	Lat

for 63 Deg.

Difference of Latitude and Departure for 28 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.9	00.5	61	53.9	28.6	121	106.8	56.8	181	159.8	85.0	241	212.8	113.1
2	01.8	00.9	62	54.7	29.1	22	107.7	57.3	82	160.7	85.4	42	213.7	113.6
3	02.6	01.4	63	55.6	29.6	23	108.6	57.7	83	161.6	85.9	43	214.6	114.1
4	03.5	01.9	64	56.5	30.0	24	109.5	58.2	84	162.5	86.4	44	215.5	114.6
5	04.4	02.3	65	57.4	30.5	25	110.4	58.7	85	163.4	86.9	45	216.3	115.0
6	05.3	02.8	66	58.3	31.0	26	111.3	59.2	86	164.2	87.3	46	217.2	115.5
7	06.2	03.3	67	59.2	31.5	27	112.1	59.6	87	165.1	87.8	47	218.1	115.9
8	07.1	03.8	68	60.0	31.9	28	113.0	60.1	88	166.0	88.3	48	219.0	116.4
9	07.9	04.3	69	60.9	32.4	29	113.9	60.6	89	166.9	88.7	49	219.9	116.9
10	08.8	04.7	70	61.8	32.9	30	114.8	61.0	90	167.8	89.2	50	220.8	117.4
11	09.7	05.2	71	62.7	33.3	131	115.7	61.5	191	168.7	89.7	251	221.6	117.8
12	10.6	05.6	72	63.6	33.8	32	116.6	62.0	92	169.5	90.1	52	222.5	118.3
13	11.5	06.1	73	64.5	34.3	33	117.4	62.4	93	170.4	90.6	53	223.4	118.8
14	12.4	06.6	74	65.3	34.7	34	118.3	62.9	94	171.3	91.1	54	224.3	119.2
15	13.2	07.0	75	66.2	35.2	35	119.2	63.4	95	172.2	91.6	55	225.2	119.7
16	14.1	07.5	76	67.1	35.7	36	120.1	63.9	96	173.1	92.0	56	226.0	120.2
17	15.0	08.0	77	68.0	36.2	37	121.0	64.3	97	174.0	92.5	57	226.9	120.7
18	15.9	08.5	78	68.9	36.6	38	121.9	64.8	98	174.8	93.0	58	227.8	121.1
19	16.8	08.9	79	69.8	37.1	39	122.7	65.3	99	175.7	93.4	59	228.7	121.6
20	17.7	09.4	80	70.6	37.6	40	123.6	65.7	200	176.6	93.9	60	229.6	122.1
21	18.5	09.9	81	71.5	38.0	141	124.5	66.2	201	177.5	94.4	261	230.5	122.5
22	19.4	10.3	82	72.4	38.5	42	125.4	66.7	02	178.4	94.8	62	231.3	123.0
23	20.3	10.8	83	73.3	39.0	43	126.3	67.1	03	179.2	95.3	63	232.2	123.5
24	21.2	11.3	84	74.2	39.4	44	127.2	67.6	04	180.1	95.8	64	233.1	123.9
25	22.1	11.7	85	75.1	39.9	45	128.0	68.1	05	181.0	96.2	65	234.0	124.4
26	23.0	12.2	86	75.9	40.4	46	128.9	68.5	06	181.9	96.7	66	234.9	124.9
27	23.8	12.7	87	76.8	40.8	47	129.8	69.0	07	182.8	97.2	67	235.8	125.4
28	24.7	3.1	88	77.7	41.3	48	130.7	69.5	08	183.7	97.7	68	236.6	125.8
29	25.6	13.6	89	78.6	41.8	49	131.6	70.0	09	184.5	98.1	69	237.5	126.3
30	26.5	14.1	90	79.5	42.3	50	132.5	70.4	10	185.4	98.6	70	238.4	126.8
31	27.4	14.6	91	80.4	42.7	151	133.3	70.9	211	186.3	99.1	271	239.3	127.2
32	28.3	15.0	92	81.2	43.2	52	134.2	71.4	12	187.2	99.5	72	240.2	127.7
33	29.1	15.5	93	82.1	43.7	53	135.1	71.8	13	188.1	100.0	73	241.1	128.2
34	30.0	16.0	94	83.0	44.1	54	136.0	72.3	14	189.0	100.5	74	241.9	128.6
35	30.9	16.4	95	83.9	44.6	55	136.9	72.8	15	189.8	100.9	75	242.8	129.1
36	31.8	16.9	96	84.8	45.1	56	137.7	73.2	16	190.7	101.4	76	243.7	129.6
37	32.7	17.4	97	85.7	45.5	57	138.6	73.7	17	191.6	101.9	77	244.6	130.1
38	33.6	17.8	98	86.5	46.0	58	139.5	74.2	18	192.5	102.4	78	245.5	130.5
39	34.5	18.3	99	87.4	46.5	59	140.4	74.6	19	193.4	102.8	79	246.4	131.0
40	35.3	18.8	100	88.3	47.0	60	141.3	75.1	20	194.3	103.3	80	247.3	131.5
41	36.2	19.2	101	89.2	47.4	161	142.2	73.6	221	195.1	103.8	281	248.1	131.9
42	37.1	19.7	02	90.1	47.9	62	143.0	76.1	22	196.0	104.2	82	249.0	132.4
43	38.0	20.2	03	90.9	48.4	63	143.9	76.5	23	196.9	104.7	83	249.9	132.9
44	38.9	20.7	04	91.8	48.8	64	144.8	77.0	24	197.8	105.2	84	250.8	133.3
45	39.7	21.1	05	92.7	49.3	65	145.7	77.5	25	198.7	105.6	85	251.7	133.8
46	40.6	21.6	06	93.6	49.8	66	146.6	77.9	26	199.6	106.1	86	252.5	134.3
47	41.5	22.1	07	94.5	50.2	67	147.5	78.4	27	200.4	106.6	87	253.4	134.7
48	42.4	22.5	08	95.4	50.7	68	148.3	78.9	28	201.3	107.0	88	254.3	135.2
49	43.3	23.0	09	96.2	51.2	69	149.2	79.3	29	202.2	107.5	89	255.2	135.7
50	44.2	23.5	10	97.1	51.6	70	150.1	79.8	30	203.1	108.0	90	256.1	136.1
51	45.0	23.9	111	98.0	52.1	171	151.0	80.3	231	204.0	108.5	291	257.0	136.6
52	45.9	24.4	12	98.9	52.6	72	151.9	80.8	32	204.9	108.9	92	257.8	137.1
53	46.8	24.9	13	99.8	53.1	73	152.8	81.2	33	205.7	109.4	93	258.7	137.6
54	47.7	25.4	14	100.7	53.5	74	153.6	81.7	34	206.6	109.9	94	259.6	138.0
55	48.6	25.8	15	101.5	54.0	75	154.5	82.2	35	207.5	110.3	95	260.5	138.5
56	49.4	26.3	16	102.4	54.5	76	155.4	82.6	36	208.4	110.8	96	261.4	139.0
57	50.3	26.8	17	103.3	54.9	77	156.3	83.1	37	209.3	111.3	97	262.3	139.4
58	51.2	27.2	18	104.2	55.4	78	157.2	83.6	38	210.2	111.7	98	263.1	139.9
59	52.1	27.7	19	105.1	55.9	79	158.1	84.0	39	211.0	112.2	99	264.0	140.4
60	53.0	28.2	20	106.0	56.3	80	158.9	84.5	40	211.9	112.7	300	264.9	140.9
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 62 Deg.

Difference of Latitude and Departure for 29 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.9	00.5	61	53.4	29.6	121	105.8	58.7	181	158.3	87.7	241	210.8	116.8
2	01.7	01.0	62	54.2	30.1	22	106.7	59.1	82	159.2	88.2	42	211.7	117.3
3	02.6	01.5	63	55.1	30.5	23	107.6	59.6	83	160 1	88.7	43	212.5	117.8
4	03.5	01.9	64	56.0	31.0	24	108.5	60.1	84	160.9	89.2	44	213.4	118.3
5	04.4	02.4	65	56.8	31.5	25	109.3	60.6	85	161.8	89.7	45	214.3	118.8
6	05.2	02.9	66	57.7	32.0	26	110.2	61.1	86	162.7	90.2	46	215.2	119.3
7	06.1	03.4	67	58.6	32.5	27	111.1	61.6	87	163.6	90.7	47	216.0	119.7
8	07.0	03.9	68	59.5	33.0	28	111.9	62.1	88	164.4	91.1	48	216.9	120.2
9	07.9	04.4	69	60.3	33.5	29	112.8	62.5	89	165.3	91.6	49	217.9	120.7
10	08.7	04.8	70	61.2	33.9	30	113.7	63.0	90	166.2	92.1	50	218.7	121.2
11	09.6	05.3	71	62.1	34.4	131	114.6	63.5	191	167.0	92.6	251	219.5	121.7
12	10.5	05.8	72	63.0	34.9	32	115.4	64.0	92	167.9	93.1	52	220.4	122.2
13	11.4	06.3	73	63.8	35.4	33	116.3	64.5	93	168.8	93.6	53	221.3	122.7
14	12.2	06.8	74	64.7	35.9	34	117.2	65.0	94	169.7	94.1	54	222.2	123.1
15	13.1	07.3	75	65.6	36.4	35	118.1	65.4	95	170.5	94.5	55	223.0	123.6
16	14.0	07.8	76	66.5	36.8	36	118.9	65.9	96	171.4	95.0	56	223.9	124.1
17	14.9	08.2	77	67.3	37.3	37	119.8	66.4	97	172.3	95.5	57	224.8	124.6
18	15.7	08.7	78	68.2	37.8	38	120.7	66.9	98	173.2	96.0	58	225.7	125.1
19	16.6	09.2	79	69.1	38.3	39	121.6	67.4	99	174.0	96.5	59	226.6	125.6
20	17.5	09.7	80	70.0	38.8	40	122.4	67.9	200	174.9	97.0	60	227.5	126.0
21	18.4	10.2	81	70.8	39.3	141	123.3	68.4	201	175.8	97.4	261	228.3	126.5
22	19.2	10.7	82	71.7	39.8	42	124.2	68.9	02	176.7	97.9	62	229.1	127.0
23	20.1	11.2	83	72.6	40.2	43	125.1	69.3	03	177.5	98.4	63	230.0	127.5
24	21.0	11.6	84	73.5	40.7	44	125.9	69.8	04	178.4	98.9	64	230.9	128.0
25	21.9	12.1	85	74.3	41.2	45	126.8	70.3	05	179.3	99.4	65	231.8	128.5
26	22.7	12.6	86	75.2	41.7	46	127.7	70.8	06	180.2	99.9	66	232.6	129.0
27	23.6	13.1	87	76.1	42.2	47	128.6	71.3	07	181.0	100.4	67	233.5	129.4
28	24.5	13.6	88	77.0	42.7	48	129.4	71.8	08	181.9	100.8	68	234.4	129.9
29	25.4	14.1	89	77.8	43.1	49	130.3	72.2	09	182.8	101.4	69	235.3	130.4
30	26.2	14.5	90	78.7	43.6	50	131.2	72.7	10	183.7	101.8	70	236.1	130.9
31	27.1	15.0	91	79.6	44.1	151	132.1	73.2	211	184.5	102.3	271	237.0	131.4
32	28.0	15.5	92	80.5	44.6	52	132.9	73.7	12	185.4	102.8	72	237.9	131.9
33	28.9	16.0	93	81.3	45.1	53	133.8	74.2	13	186.3	103.3	73	238.8	132.4
34	29.7	16.5	94	82.2	45.6	54	134.7	74.7	14	187.2	103.7	74	239.6	132.8
35	30.6	17.0	95	83.1	46.1	55	135.6	75.1	15	188.0	104.2	75	240.5	133.3
36	31.5	17.5	96	84.0	46.5	56	136.4	75.6	16	188.9	104.7	76	241.4	133.8
37	32.4	17.9	97	84.8	47.0	57	137.3	76.1	17	189.8	105.2	77	242.3	134.3
38	33.2	18.4	98	85.7	47.5	58	138.2	76.6	18	190.7	105.7	78	243.1	134.8
39	34.1	18.9	99	86.6	48.0	59	139.1	77.1	19	191.5	106.2	79	244.0	135.3
40	35.0	19.4	100	87.5	48.5	60	139.9	77.6	20	192.4	106.7	80	244.9	135.7
41	35.9	19.9	101	88.3	49.0	161	140.8	78.1	221	193.3	107.1	281	245.8	136.2
42	36.7	20.4	02	89.2	49.4	62	141.7	78.5	22	194.2	107.6	82	246.6	136.7
43	37.6	20.8	03	90.1	49.9	63	142.6	79.0	23	195.0	108.1	83	247.5	137.2
44	38.5	21.3	04	91.0	50.4	64	143.4	79.5	24	195.9	108.6	84	248.4	137.7
45	39.4	21.8	05	91.8	50.9	65	144.3	80.0	25	196.8	109.1	85	249.3	138.2
46	40.2	22.3	06	92.7	51.4	66	145.2	80.5	26	197.7	109.6	86	250.1	138.7
47	41.1	22.8	07	93.6	51.9	67	146.1	81.0	27	198.5	110.0	87	250.0	139.1
48	42.0	23.3	08	94.5	52.4	68	146.9	81.4	28	199.4	110.5	88	251.9	139.6
49	42.9	23.8	09	95.3	52.8	69	147.8	81.9	29	200.3	111.0	89	252.8	140.1
50	43.7	24.2	10	96.2	53.3	70	148.7	82.4	30	201.2	111.5	90	253.6	140.6
51	44.6	24.7	111	97.1	53.8	171	149.6	82.9	231	202.0	112.0	291	254.5	141.1
52	45.5	25.2	12	98.0	54.3	72	150.4	83.4	32	202.9	112.5	92	255.4	141.6
53	46.4	25.7	13	98.8	54.8	73	151.3	83.9	33	203.8	113.0	93	256.3	142.0
54	47.2	26.2	14	99.7	55.3	74	152.2	84.4	34	204.7	113.4	94	257.1	142.5
55	48.1	26.7	15	100.6	55.8	75	153.1	84.8	35	205.5	113.9	95	258.0	143.0
56	49.0	27.1	16	101.5	56.2	76	153.9	85.3	36	206.4	114.4	96	258.9	143.5
57	49.9	27.6	17	102.3	56.7	77	154.8	85.8	37	207.3	114.9	97	259.8	144.0
58	50.7	28.1	18	103.2	57.2	78	155.7	86.3	38	208.2	115.4	98	260.6	144.5
59	51.6	28.6	19	104.1	57.7	79	156.6	86.8	39	209.0	115.9	99	260.5	145.0
60	52.5	29.1	20	105.0	58.2	80	157.4	87.3	40	209.9	116.4	300	262.4	145.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 61 Deg.

Difference of Latitude and Departure for 30 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.9	00.5	61	52.8	30.5	121	104.8	60.5	181	156.7	90.5	241	208.7	120.5
2	01.7	01.0	62	53.7	31.0	22	105.7	61.0	82	157.6	91.0	42	209.6	121.0
3	02.6	01.5	63	54.6	31.5	23	106.5	61.5	83	158.5	91.5	43	210.4	121.5
4	03.5	02.0	64	55.4	32.0	24	107.4	62.0	84	159.3	91.0	44	211.3	122.0
5	04.3	02.5	65	56.3	32.5	25	108.3	62.5	85	160.2	92.5	45	212.2	122.5
6	05.2	03.0	66	57.2	33.0	26	109.1	63.0	86	161.1	93.0	46	213.0	123.0
7	06.1	03.5	67	58.0	33.5	27	110.0	63.5	87	161.9	95.5	47	213.9	123.5
8	06.9	04.0	68	58.9	34.0	28	110.8	64.0	88	162.8	94.0	48	214.8	124.0
9	07.8	04.5	69	59.8	34.5	29	111.7	64.5	89	163.7	94.5	49	215.6	124.5
10	08.7	05.0	70	60.6	35.0	30	112.6	65.0	90	164.5	95.0	50	216.5	125.0
11	09.5	05.5	71	61.5	35.5	131	113.4	65.5	191	165.4	95.5	251	217.4	125.5
12	10.4	06.0	72	62.4	36.0	32	114.3	66.0	92	166.3	96.0	52	218.2	126.0
13	11.3	06.5	73	63.2	36.5	33	115.2	66.5	93	167.1	96.5	53	219.1	126.5
14	12.1	07.0	74	64.1	37.0	34	116.0	67.0	94	168.0	97.0	54	220.0	127.0
15	13.0	07.5	75	65.0	37.5	35	116.9	67.5	95	168.9	97.5	55	220.8	127.5
16	13.9	08.0	76	65.8	38.0	36	117.8	68.0	96	169.7	98.0	56	221.7	128.0
17	14.7	08.5	77	66.7	38.5	37	118.6	68.5	97	170.6	98.5	57	222.6	128.5
18	15.6	09.0	78	67.5	39.0	38	119.5	69.0	98	171.5	99.0	58	223.4	129.0
19	16.5	09.5	79	68.4	39.5	39	120.4	69.5	99	172.3	99.5	59	224.3	129.5
20	17.3	10.0	80	69.3	40.0	40	121.2	70.0	200	173.2	100.0	60	225.2	130.0
21	18.2	10.5	81	70.1	40.5	141	122.1	70.5	201	174.1	100.5	261	226.0	130.5
22	19.1	11.0	82	71.0	41.0	42	123.0	71.0	02	174.9	101.0	62	226.9	131.0
23	19.9	11.5	83	71.9	41.5	43	123.8	71.5	03	175.8	101.5	63	227.8	131.5
24	20.8	12.0	84	72.7	42.0	44	124.7	72.0	04	176.7	102.0	64	228.6	132.0
25	21.7	12.5	85	73.6	42.5	45	125.6	72.5	05	177.5	102.5	65	229.5	132.5
26	22.5	13.0	86	74.5	43.0	46	126.4	73.0	06	178.4	103.0	66	230.4	133.0
27	23.4	13.5	87	75.3	43.5	47	127.3	73.5	07	179.3	103.5	67	231.2	133.5
28	24.2	14.0	88	76.2	44.0	48	128.2	74.0	08	180.1	104.0	68	232.1	134.0
29	25.1	14.5	89	77.1	44.5	49	129.0	74.5	09	181.0	104.5	69	233.0	134.5
30	26.0	15.0	90	77.9	45.0	50	129.9	75.0	10	181.9	105.0	70	233.8	135.0
31	26.8	15.5	91	78.8	45.5	151	130.8	75.5	211	182.7	105.5	271	234.7	135.5
32	27.7	16.0	92	79.7	46.0	52	131.6	76.0	12	183.6	106.0	72	235.6	136.0
33	28.6	16.5	93	80.5	46.5	53	132.5	76.5	13	184.5	106.5	73	236.4	136.5
34	29.4	17.0	94	81.4	47.0	54	133.4	77.0	14	185.3	107.0	74	237.3	137.0
35	30.3	17.5	95	82.3	47.5	55	134.2	77.5	15	186.2	107.5	75	238.2	137.5
36	31.2	18.0	96	83.1	48.0	56	135.1	78.0	16	187.1	108.0	76	239.0	138.0
37	32.0	18.5	97	84.0	48.5	57	136.0	78.5	17	187.9	108.5	77	39.9	138.5
38	32.9	19.0	98	84.9	49.0	58	136.8	79.0	18	188.8	109.0	78	240.7	139.0
39	33.8	19.5	99	85.7	49.5	59	137.7	79.5	19	189.7	109.5	79	241.6	139.5
40	34.6	20.0	100	86.6	50.0	60	138.6	80.0	20	190.5	110.0	80	242.5	140.0
41	35.5	20.5	101	87.5	50.5	161	139.4	80.5	221	191.4	110.5	281	243.3	140.5
42	36.4	21.0	02	88.3	51.0	62	140.3	81.0	22	192.3	111.0	82	244.2	141.0
43	37.2	21.5	03	89.2	51.5	63	141.2	81.5	23	193.1	111.5	83	245.1	141.5
44	38.1	22.0	04	90.1	52.0	64	142.0	82.0	24	194.0	112.0	84	245.9	142.0
45	39.0	22.5	05	90.9	52.5	65	142.9	82.5	25	194.9	112.5	85	246.8	142.5
46	39.8	23.0	06	91.8	53.0	66	143.8	83.0	26	195.7	113.0	86	247.7	143.0
47	40.7	23.5	07	92.7	53.5	67	144.6	83.5	27	196.6	113.5	87	248.5	143.5
48	41.5	24.0	08	93.5	54.0	68	145.5	84.0	28	197.4	114.0	88	249.4	144.0
49	42.4	24.5	09	94.4	54.5	69	146.4	84.5	29	198.3	114.5	89	250.3	144.5
50	43.3	25.0	10	95.3	55.0	70	147.2	85.0	30	199.2	115.0	90	251.1	145.0
51	44.2	25.5	111	96.1	55.5	171	148.1	85.5	231	200.0	115.5	291	252.0	145.5
52	45.0	26.0	12	97.0	56.0	72	149.0	86.0	32	200.9	116.0	92	252.9	146.0
53	45.9	26.5	13	97.9	56.5	73	149.8	86.5	33	201.8	116.5	93	253.7	146.5
54	46.8	27.0	14	98.7	57.0	74	150.7	87.0	34	202.6	117.0	94	254.6	147.0
55	47.6	27.5	15	99.6	57.5	75	151.6	87.5	35	203.5	117.5	95	255.5	147.5
56	48.5	28.0	16	100.5	58.0	76	152.4	88.0	36	204.4	118.0	96	256.3	148.0
5	49.4	28.5	17	101.3	58.5	77	153.3	88.5	37	205.2	118.5	97	257.2	148.5
58	50.2	29.0	18	102.2	59.0	78	154.1	89.0	38	206.1	119.0	98	258.1	149.0
59	51.1	29.5	19	103.1	59.5	79	155.0	89.5	39	207.0	119.5	99	258.9	149.5
60	52.0	30.0	20	103.9	60.0	80	155.9	90.0	40	207.5	120.0	300	259.8	150.0
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 60 Deg.

Difference of Latitude and Departure for 31 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	L	Dep
1	00.9	00.5	61	52.3	31.4	121	103.7	62.3	181	155.1	93.2	241	206.5	124.1
2	01.7	01.0	62	53.1	31.9	22	104.6	62.8	82	156.0	93.7	4	07.4	124.6
3	02.6	01.5	63	54.0	32.4	23	105.4	63.3	83	156.8	94.2	43	208.3	125.1
4	03.4	02.1	64	54.8	33.0	24	106.3	63.9	84	157.7	94.8	44	209.1	125.6
5	04.3	02.6	65	55.7	33.5	25	107.1	64.4	85	158.5	95.3	45	210.0	126.2
6	05.1	03.1	66	56.6	34.0	26	108.0	64.9	86	159.4	95.8	46	210.8	26.7
7	06.0	03.6	67	57.4	34.5	27	108.8	65.4	87	160.3	96.3	47	211.7	127.2
8	06.9	04.1	68	58.3	35.0	28	109.7	65.9	88	161.1	96.8	48	212.5	127.7
9	07.7	04.6	69	59.1	35.5	29	110.6	66.4	89	162.0	97.3	49	213.4	128.2
10	08.6	05.2	79	60.0	36.1	30	111.4	67.0	90	162.8	97.9	50	214.3	128.8
11	09.4	05.7	71	60.8	36.6	131	112.3	67.5	191	163.7	98.4	251	215.1	129.3
12	10.3	06.2	72	61.7	37.1	32	113.1	68.0	92	164.5	98.9	52	216.0	129.8
13	11.1	06.7	73	62.6	37.6	33	114.0	68.5	93	165.4	99.4	53	216.8	130.3
14	12.0	07.2	74	63.4	38.1	34	114.8	69.0	94	166.3	99.9	54	217.7	130.8
15	13.9	07.7	75	64.3	38.6	35	115.7	69.5	95	167.1	100.4	55	218.5	131.3
16	13.7	08.2	76	65.1	39.1	36	116.6	70.0	96	168.0	100.9	56	219.4	131.8
17	14.6	08.8	77	66.0	39.7	37	117.4	70.6	97	168.8	101.5	57	220.2	132.4
18	15.4	09.3	78	66.8	40.2	38	118.3	71.1	98	169.7	102.0	58	221.1	132.9
19	16.3	09.8	79	67.7	40.7	39	119.1	71.6	99	170.5	102.5	59	222.0	133.4
20	17.1	10.3	80	68.6	41.2	40	120.0	72.1	200	171.4	103.0	60	222.8	133.9
21	18.0	10.8	81	69.4	41.7	141	120.8	72.6	201	172.3	103.5	261	223.7	134.4
22	18.9	11.3	82	70.3	42.2	42	121.7	73.1	02	173.1	104.0	62	224.5	134.9
23	19.7	11.8	83	71.1	42.7	43	122.6	73.6	03	174.0	104.5	63	225.4	135.4
24	20.6	12.4	84	72.0	43.3	44	123.4	74.2	04	174.8	105.1	64	226.2	136.0
25	21.4	12.9	85	72.8	43.8	45	124.3	74.7	05	175.7	105.6	65	227.1	136.5
26	22.3	13.4	86	73.7	44.3	46	125.1	75.2	06	176.5	106.1	66	228.0	137.0
27	23.1	13.9	87	74.6	44.8	47	126.0	75.7	07	177.4	106.6	67	228.8	137.5
28	24.0	14.4	88	75.4	45.3	48	126.8	76.2	08	178.3	107.1	68	229.7	138.0
29	24.9	14.9	89	76.3	45.8	49	127.7	76.7	09	179.1	107.6	69	230.5	138.5
30	25.7	15.5	90	77.1	46.4	50	128.6	77.3	10	180.0	108.2	70	231.4	139.1
31	26.6	16.0	91	78.0	46.9	151	129.4	77.8	211	180.8	108.7	271	232.2	139.6
32	27.4	16.5	92	78.8	47.4	52	130.3	78.3	12	181.7	109.2	72	233.1	140.1
33	28.3	17.0	93	79.7	47.9	53	131.1	78.8	13	182.5	109.7	73	234.0	140.6
34	29.1	17.5	94	80.6	48.4	54	132.0	79.3	14	183.4	110.2	74	234.8	141.1
35	30.0	18.0	95	81.4	48.9	55	132.8	79.8	15	184.3	110.7	75	235.7	141.6
36	30.9	18.5	96	82.3	49.4	56	133.7	80.3	16	185.1	111.2	76	236.5	142.1
37	31.7	19.1	97	83.1	50.0	57	134.5	80.9	17	186.0	111.8	77	237.4	142.7
38	32.6	19.6	98	84.0	50.5	58	135.4	81.4	18	186.8	112.3	78	238.2	143.2
39	33.4	20.1	99	84.8	51.0	59	136.3	81.9	19	187.7	112.8	79	239.1	143.7
40	34.3	20.6	100	85.7	51.5	60	137.1	82.4	20	188.5	113.3	80	240.0	144.2
41	35.1	21.1	101	86.6	52.0	161	138.0	82.9	221	189.4	113.8	281	240.8	144.7
42	36.0	21.6	02	87.4	52.5	62	138.8	83.4	22	190.3	114.3	82	241.7	145.2
43	36.9	22.1	03	88.3	53.0	63	139.7	83.9	23	191.1	114.8	83	242.5	145.7
44	37.7	22.6	04	89.1	53.6	64	140.5	84.5	24	192.0	115.4	84	243.4	146.3
45	38.6	23.2	05	90.0	54.1	65	141.4	85.0	25	192.8	115.9	85	244.2	146.8
46	39.4	23.7	06	90.8	54.6	66	142.3	85.5	26	193.7	116.4	86	245.1	147.3
47	40.3	24.2	07	91.7	55.1	67	143.1	86.0	27	194.5	116.9	87	246.0	147.8
48	41.1	24.7	08	92.6	55.6	68	144.0	86.5	28	195.4	117.4	88	246.8	148.3
49	42.0	25.2	09	93.4	56.1	69	144.8	87.0	29	196.3	117.9	89	247.7	148.8
50	42.9	25.8	10	94.3	56.7	70	145.7	87.6	30	197.1	118.5	90	248.5	149.4
51	43.7	26.3	111	95.1	57.2	171	146.5	88.1	231	198.0	119.0	291	249.4	149.4
52	44.6	26.8	12	96.0	57.7	72	147.4	88.6	32	198.8	119.5	92	250.2	150.4
53	45.4	27.3	13	96.8	58.2	73	148.3	89.1	33	199.7	120.0	93	251.1	150.9
54	46.3	27.8	14	97.7	58.7	74	149.1	89.6	34	200.5	120.5	94	252.0	151.4
55	47.1	28.3	15	98.6	59.2	75	150.0	90.1	35	201.4	121.0	95	252.8	151.9
56	48.0	28.8	16	99.4	59.7	76	150.8	90.6	36	202.3	121.5	96	253.7	152.4
57	48.8	29.4	17	100.3	60.3	77	151.7	91.2	37	203.1	122.1	97	254.5	153.0
58	49.7	29.9	18	101.1	60.8	78	152.5	91.7	38	204.0	122.6	98	255.4	153.5
59	50.6	30.4	19	102.0	61.3	79	153.4	92.2	39	204.8	123.1	99	256.2	154.0
60	51.4	30.9	20	102.8	61.8	80	154.3	92.7	40	205.7	123.6	300	257.1	154.5
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 59 Deg.

Difference of Latitude and Departure for 32 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	D.ſt	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.5	61	51.7	32.3	121	102.6	64.1	181	153.5	95.9	241	204.4	127.7
2	01.7	01.1	62	52.6	32.9	22	103.5	64.7	82	154.3	90.5	42	205.2	128.3
3	02.5	01.6	63	53.4	33.4	23	104.3	65.2	83	155.2	97.0	43	206.1	128.8
4	03.4	02.1	64	54.3	33.9	24	105.2	65.7	84	156.0	97.5	44	206.9	129.3
5	04.2	02.6	65	55.1	34.5	25	106.0	66.3	85	156.9	98.1	45	207.8	129.9
6	05.1	03.2	66	56.0	35.0	26	106.8	66.8	86	157.7	98.6	46	208.6	130.4
7	05.9	03.7	67	56.8	35.5	27	107.7	67.3	87	158.6	99.1	47	209.5	130.9
8	07.8	04.2	68	57.7	36.0	28	108.5	67.8	88	159.4	99.6	48	210.3	131.4
9	07.6	04.8	69	58.5	36.6	29	109.4	68.4	89	160.3	100.2	49	211.2	132.0
10	08.5	05.3	70	59.4	37.1	30	110.2	68.9	90	161.1	100.7	50	212.0	132.5
11	09.3	05.8	71	60.2	37.6	131	111.1	69.4	191	162.0	101.2	251	212.8	133.0
12	10.2	6.4	72	61.1	38.2	32	111.9	70.0	92	162.8	101.8	52	213.7	133.6
13	11.0	06.9	73	61.9	38.7	33	112.8	70.5	93	163.7	102.3	53	214.5	134.1
14	11.9	07.4	74	62.8	39.2	34	113.6	71.0	94	164.5	102.8	54	215.4	134.6
15	12.7	08.0	75	63.6	39.8	35	114.5	71.6	95	165.4	103.4	55	216.2	135.2
16	13.6	08.5	76	64.4	40.3	36	115.3	72.1	96	166.2	103.9	56	217.1	135.7
17	14.4	09.0	77	65.3	40.8	37	116.2	72.6	97	167.1	104.4	57	217.9	136.2
18	15.3	09.5	78	66.1	41.3	38	117.0	73.1	98	167.9	104.9	58	218.8	136.7
19	16.1	10.1	79	67.0	41.9	39	117.9	73.7	99	168.8	105.5	59	219.6	137.3
20	17.0	10.6	80	67.8	42.4	40	118.8	74.2	200	169.6	106.0	60	220.5	137.8
21	17.8	11.1	81	68.7	42.9	141	119.6	74.7	201	170.4	106.5	261	221.3	138.3
22	18.7	11.7	82	69.5	43.5	42	120.4	75.3	02	171.3	107.1	62	222.2	138.9
23	19.5	12.2	83	70.4	44.0	43	121.3	75.8	03	172.1	107.6	63	223.0	139.4
24	20.4	12.7	84	71.2	44.5	44	122.1	76.3	04	173.0	108.1	64	223.9	139.9
25	21.2	13.3	85	72.1	45.1	45	123.0	76.9	05	173.8	108.7	65	224.7	140.5
26	22.0	13.8	86	72.9	45.6	46	123.8	77.4	06	174.7	109.2	66	225.6	141.0
27	22.9	14.3	87	73.8	46.1	47	124.7	77.9	07	175.5	109.7	67	226.4	141.5
28	23.7	14.8	88	74.6	46.6	48	125.5	78.4	08	176.4	110.2	68	227.3	142.0
29	24.6	15.4	89	75.5	47.2	49	126.4	79.0	09	177.2	110.8	69	228.	42.6
30	25.4	15.9	90	76.3	47.7	50	127.2	79.5	10	178.1	111.3	70	229.0	43.1
31	26.3	16.4	91	77.2	48.2	151	128.0	80.0	211	178.9	111.8	271	[illegible]	43.6
32	27.1	17.0	92	78.0	48.8	52	128.9	80.6	12	179.8	112.4	72	230.7	44.2
33	28.0	17.5	93	78.9	49.3	53	129.7	81.1	13	180.5	112.9	73	231.5	144.7
34	28.8	18.0	94	79.7	49.8	54	130.6	81.6	14	181.5	113.4	74	232.4	145.2
35	29.7	18.6	95	80.6	50.4	55	131.4	82.2	15	182.3	114.0	75	233.2	145.8
36	30.5	19.1	96	81.4	50.9	56	132.3	82.7	17	183.2	114.5	76	23 0	46.3
37	31.4	19.6	97	82.3	51.4	57	133.1	83.2	16	184.0	115.0	77	23 .9	46.8
38	32.2	20.1	98	83.1	51.9	58	134.0	83.7	18	184.9	115.5	78	235.7	47.3
39	33.1	20.7	99	84.0	52.5	59	134.8	84.3	19	185.7	116.1	79	236.6	147.9
40	33.9	21.2	100	84.8	53.0	60	135.7	84.8	20	186.6	116.6	80	237.4	148.4
41	34.8	21.7	101	85.6	53.5	161	136.5	85.3	221	187.4	117.1	281	238.3	148.9
42	35.6	22.3	02	86.5	54.1	62	137.4	85.9	22	188.3	117.7	82	239.1	49.5
43	36.5	22.8	03	87.3	54.6	63	138.2	86.4	23	189.1	118.2	83	240.0	50.0
44	37.3	23.3	04	88.2	55.1	64	139.1	86.9	24	190.0	118.7	84	240.8	150.5
45	38.2	23.9	05	89.0	55.7	65	139.9	87.5	25	190.8	119.3	85	241.7	151.1
46	39.0	24.4	06	89.9	56.2	66	140.8	88.0	26	191.6	119.8	86	242.5	151.6
47	39.9	24.9	07	90.7	56.7	67	141.6	88.5	27	192.5	120.3	87	243.4	152.1
48	40.7	25.4	08	91.6	57.2	68	142.5	89.0	28	193.3	120.8	88	244.2	152.6
49	41.6	26.0	09	92.4	57.8	69	143.3	89.6	29	194.2	121.4	89	245.1	153.2
50	42.4	26.5	10	93.3	58.3	70	144.2	90.1	30	195.0	121.9	90	245.9	153.7
51	43.2	27.0	111	94.1	58.8	171	145.0	90.6	231	195.9	122.4	291	246.8	154.2
52	44.1	27.6	12	95.0	59.4	72	145.9	91.2	32	196.7	123.0	92	247.6	154.8
53	44.9	28.1	13	95.8	59.9	73	146.7	91.7	33	197.6	123.5	93	248.5	155.3
54	45.8	28.6	14	96.7	60.0	74	147.6	92.2	34	198.4	124.0	94	249.3	155.8
55	46.6	29.2	15	97.5	61.0	75	148.4	92.8	35	199.3	124.6	95	250.2	156.4
56	47.5	29.7	16	98.4	61.5	76	149.2	93.3	36	200.1	125.1	96	251.0	156.9
57	48.3	30.2	17	99.2	62.0	77	150.1	93.8	37	201.0	125.6	97	251.9	157.4
58	49.2	30.7	18	100.1	62.5	78	150.9	94.3	38	201.8	126.1	98	252.7	157.9
59	50.0	31.3	19	100.9	63.1	79	151.8	94.9	39	202.7	126.7	99	253.6	158.
60	50.9	31.8	20	101.8	63.6	80	152.6	95.4	40	203.5	127.2	300	254.4	159.0
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 58 Deg.

Difference of Latitude and Departure for 33 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.5	61	51.2	33.2	121	101.5	65.9	181	151.8	98.6	241	201.1	131.2
2	01.7	01.1	62	52.0	33.8	22	102.3	66.4	82	152.6	99.1	42	202.9	131.8
3	02.5	01.6	63	52.8	34.3	23	103.1	67.0	83	153.5	99.7	43	203.8	132.3
4	03.4	02.2	64	53.7	34.9	24	104.0	67.5	84	154.3	100.2	44	204.6	132.9
5	04.2	02.7	65	54.5	35.4	25	104.8	68.1	85	155.1	100.8	45	205.5	133.4
6	05.0	03.3	66	55.3	35.9	26	105.7	68.6	86	156.0	101.3	46	206.3	134.0
7	05.9	03.8	67	56.2	36.5	27	106.5	69.2	87	156.8	101.8	47	207.1	134.5
8	06.7	04.4	68	57.0	37.0	28	107.3	69.7	88	157.7	102.4	48	208.0	135.1
9	07.5	04.9	69	57.9	37.6	29	108.2	70.3	89	158.5	102.9	49	208.8	135.6
10	08.4	05.4	70	58.7	38.1	30	109.0	70.8	90	159.3	103.5	50	209.7	136.2
11	09.2	06.0	71	59.5	38.7	131	109.9	71.3	191	160.2	104.0	251	210.5	136.7
12	10.1	06.5	72	60.4	39.2	32	110.7	71.9	92	161.0	104.6	52	211.3	137.2
13	10.9	07.1	73	61.2	39.8	33	111.5	72.4	93	161.8	105.1	53	212.2	137.8
14	11.7	07.6	74	62.1	40.3	34	112.4	73.0	94	162.7	105.7	54	213.0	138.3
15	12.6	08.2	75	62.9	40.8	35	113.2	73.5	95	163.5	106.2	55	213.8	138.9
16	13.4	08.7	76	63.7	41.4	36	114.0	74.1	96	164.4	106.7	56	214.7	139.4
17	14.3	09.3	77	64.6	41.9	37	114.9	74.6	97	165.2	107.3	57	215.5	140.0
18	15.1	09.8	78	65.4	42.5	38	115.7	75.2	98	166.0	107.8	58	216.4	140.5
19	15.9	10.3	79	66.2	43.0	39	116.6	75.7	99	166.9	108.4	59	217.2	141.1
20	16.8	10.9	80	67.1	43.6	40	117.4	76.2	200	167.7	108.9	60	218.0	141.6
21	17.6	11.4	81	67.9	44.1	141	118.2	76.8	201	168.6	109.5	261	218.9	142.1
22	18.4	12.0	82	68.8	44.7	42	119.1	77.3	02	169.4	110.0	62	219.7	142.7
23	19.3	12.5	83	69.6	45.2	43	119.9	77.9	03	170.2	110.6	63	220.6	143.2
24	20.1	13.1	84	70.4	45.7	44	120.8	78.4	04	171.1	111.1	64	221.4	143.8
25	21.0	13.6	85	71.3	46.3	45	121.6	79.0	05	171.9	111.6	65	222.2	144.3
26	21.8	14.2	86	72.1	46.8	46	122.4	79.5	06	172.8	112.2	66	223.1	144.9
27	22.6	14.7	87	73.0	47.4	47	123.3	80.1	07	173.6	112.7	67	223.9	145.4
28	23.5	15.2	88	73.8	47.9	48	124.1	80.6	08	174.4	113.3	68	224.7	146.0
29	24.3	15.8	89	74.6	48.5	49	125.0	81.1	09	175.3	113.8	69	225.6	146.5
30	25.2	16.3	90	75.5	49.0	50	125.8	81.7	10	176.1	114.4	70	226.4	147.0
31	26.0	16.9	91	76.3	49.6	151	126.6	82.2	211	176.9	114.9	271	227.3	147.6
32	26.8	17.4	92	77.2	50.1	52	127.5	32.8	12	177.8	115.5	72	228.1	148.1
33	27.7	18.0	93	78.0	50.6	53	128.3	83.3	13	178.6	116.0	73	228.9	148.7
34	28.5	18.5	94	78.8	51.2	54	129.1	83.9	14	179.5	116.5	74	229.8	149.2
35	29.4	19.1	95	79.7	51.7	55	130.0	84.4	15	180.3	117.1	75	230.6	149.8
36	30.2	19.6	96	80.5	52.3	56	130.8	85.0	16	181.1	117.6	76	231.5	150.3
37	31.0	20.2	97	81.3	52.8	57	131.7	85.5	17	182.0	118.2	77	232.3	150.9
38	31.9	20.7	98	82.2	53.4	58	132.5	86.0	18	182.8	118.7	78	233.1	151.4
39	32.7	21.2	99	83.0	53.9	59	133.3	86.6	19	183.7	119.3	79	234.0	151.9
40	33.5	21.8	100	83.9	54.5	60	134.2	87.1	20	184.5	119.8	80	234.8	152.5
41	34.4	22.3	101	84.7	55.0	161	135.0	87.7	221	185.3	120.4	281	235.6	153.0
42	35.2	22.9	02	85.5	55.5	62	135.9	88.2	22	186.2	120.9	82	236.5	153.6
43	36.1	23.4	03	86.4	56.1	63	136.7	88.8	23	187.0	121.4	83	237.3	154.1
44	36.9	24.0	04	87.2	56.6	64	137.5	89.3	24	187.8	122.0	84	238.2	154.7
45	37.7	24.5	05	88.1	57.2	65	138.4	89.9	25	188.7	122.5	85	239.0	155.2
46	38.6	25.1	06	88.9	57.7	66	139.2	90.4	26	189.5	123.1	86	239.8	155.8
47	39.4	25.6	07	89.7	58.3	67	140.0	90.9	27	190.4	123.6	87	240.7	156.3
48	40.3	26.1	08	90.6	58.8	68	140.9	91.5	28	191.2	124.2	88	241.5	156.8
49	41.1	26.7	09	91.4	59.4	69	141.7	92.0	29	192.0	124.7	89	242.4	157.4
50	41.9	27.2	10	92.2	59.9	70	142.6	92.6	30	192.9	125.3	90	243.2	157.9
51	42.8	27.8	111	93.1	60.5	171	143.4	93.1	231	193.7	125.8	291	244.0	158.5
52	43.6	28.3	12	93.9	61.0	72	144.2	93.7	32	194.6	126.3	92	244.9	159.0
53	44.4	28.9	13	94.8	61.5	73	145.1	94.2	33	195.4	126.9	93	245.7	159.6
54	45.3	29.4	14	95.6	62.1	74	145.9	94.8	34	196.2	127.4	94	246.5	160.1
55	46.1	30.0	15	96.4	62.6	75	146.8	95.3	35	197.1	128.0	95	247.4	160.7
56	47.0	30.5	16	97.3	63.2	76	147.6	95.8	36	197.9	128.5	96	248.2	161.2
57	47.8	31.0	17	98.1	63.7	77	148.4	96.4	37	198.7	129.1	97	249.1	161.7
58	48.6	31.6	18	99.0	64.3	78	149.3	96.9	38	199.6	129.6	98	249.9	162.3
59	49.5	32.1	19	99.8	64.8	79	150.1	97.5	39	200.4	130.2	99	250.7	162.8
60	50.3	32.7	20	100.6	65.4	80	150.9	98.0	40	201.3	130.7	300	251.6	163.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 57 Deg.

Difference of Latitude and Departure for 34 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	61	50.6	34.1	121	100.3	67.7	181	150.0	101.2	241	199.8	134.8
2	01.7	01.1	62	51.4	34.7	22	101.1	68.2	82	150.9	101.8	42	200.6	135.3
3	02.5	01.7	63	52.2	35.2	23	102.0	68.8	83	151.7	102.3	43	201.4	135.9
4	03.3	02.2	64	53.1	35.8	24	102.8	69.3	84	152.5	102.9	44	202.3	136.4
5	04.1	02.8	65	53.9	36.3	25	103.6	69.9	85	153.4	103.5	45	203.1	137.0
6	05.0	03.4	66	54.7	36.9	26	104.5	70.5	86	154.2	104.0	46	203.9	137.6
7	05.8	03.9	67	55.5	37.5	27	105.3	71.0	87	155.0	104.6	47	204.8	138.1
8	06.6	94.5	68	56.4	38.0	28	106.1	71.6	88	155.9	105.1	48	205.6	138.7
9	07.5	05.0	69	57.2	38.6	29	106.9	72.1	89	156.7	105.7	49	206.4	139.2
10	08.3	05.6	70	58.0	39.1	30	107.8	72.7	90	157.5	106.2	50	207.3	139.8
11	09.1	06.2	71	58.9	39.7	131	108.6	73.3	191	158.3	106.8	251	208.1	140.4
12	09.9	06.7	72	59.7	40.3	32	109.4	73.8	92	159.2	107.4	52	208.9	140.9
13	10.8	07.3	73	60.5	40.8	33	110.3	74.4	93	160.0	107.9	53	209.7	141.5
14	11.6	07.8	74	61.3	41.4	34	111.1	74.9	94	160.8	108.5	54	210.6	142.0
15	12.4	08.4	75	62.2	41.9	35	111.9	75.5	95	161.7	109.0	55	211.4	142.6
16	13.3	08.9	76	63.0	42.5	36	112.7	76.1	96	162.5	119.6	56	212.2	143.2
17	14.1	09.5	77	63.8	43.1	37	113.6	76.6	97	163.3	110.2	57	213.1	143.7
18	14.9	10.1	78	64.7	43.6	38	114.4	77.2	98	164.1	110.7	58	213.9	144.3
19	15.8	10.6	79	65.5	44.2	39	115.2	77.7	99	165.0	111.3	59	214.7	144.8
20	16.6	11.2	80	66.3	44.7	40	116.1	78.3	200	165.8	111.8	60	215.5	145.4
21	17.4	11.7	81	67.1	45.3	141	116.9	78.8	201	166.6	112.4	261	216.4	146.0
22	18.2	12.3	82	68.0	45.9	42	117.7	79.4	02	167.5	113.0	62	217.2	146.5
23	19.1	12.9	83	68.8	46.4	43	118.5	80.0	03	168.3	113.5	63	218.0	147.1
24	19.9	13.4	84	69.6	47.0	44	119.4	80.5	04	169.1	114.1	64	218.9	147.6
25	20.7	14.0	85	70.5	47.5	45	120.2	81.1	05	169.9	114.6	65	219.7	148.2
26	21.6	14.5	86	71.3	48.1	46	121.0	81.6	06	170.8	115.2	66	220.5	148.7
27	22.4	15.1	87	72.1	48.7	47	121.9	82.2	07	171.6	115.8	67	221.3	149.3
28	23.2	15.7	88	73.0	49.2	48	122.7	82.8	08	172.4	116.3	68	222.2	149.9
29	24.0	16.2	89	73.8	49.8	49	123.5	83.3	09	173.3	116.9	69	223.0	150.4
30	24.9	16.8	90	74.6	50.3	50	124.4	83.9	10	174.1	117.4	70	223.8	151.0
31	25.7	17.3	91	75.4	50.9	151	125.2	84.4	211	174.9	118.0	271	224.7	151.5
32	26.5	17.9	92	76.3	51.4	52	126.0	85.0	12	175.7	118.6	72	225.5	152.1
33	27.4	18.5	93	77.1	52.0	53	126.8	85.6	13	176.6	119.1	73	226.3	152.7
34	28.2	19.0	94	77.9	52.6	54	127.7	86.1	14	177.4	119.7	74	227.1	153.2
35	29.0	19.6	95	78.8	53.1	55	128.5	86.7	15	178.2	120.2	75	228.0	153.8
36	29.8	20.1	96	79.6	53.7	56	129.3	87.2	16	179.1	120.8	76	228.8	154.3
37	30.7	20.7	97	80.4	54.2	57	130.2	87.8	17	179.9	121.3	77	229.6	154.9
38	31.5	21.2	98	81.2	54.8	58	131.0	88.4	18	180.7	121.9	78	230.5	155.5
39	32.3	21.8	99	82.1	55.4	59	131.8	88.9	19	181.6	122.5	79	231.3	156.0
40	33.2	22.4	100	82.9	55.9	60	132.6	89.5	20	182.4	123.0	80	232.1	156.6
41	34.0	22.9	101	83.7	56.5	161	133.5	90.0	221	183.2	123.6	281	232.9	157.1
42	34.8	23.5	02	84.6	57.0	62	134.3	90.6	22	184.0	124.1	82	233.8	157.7
43	35.6	24.0	03	85.4	57.6	63	135.1	91.1	23	184.9	124.7	83	234.6	158.3
44	36.5	24.6	04	86.2	58.2	64	136.0	91.7	24	185.7	125.3	84	235.4	158.8
45	37.3	25.2	05	87.0	58.7	65	136.8	92.3	25	186.5	125.8	85	236.3	159.4
46	38.1	25.7	06	87.9	59.3	66	137.6	92.8	26	187.4	126.4	86	237.1	159.9
47	39.0	26.3	07	88.7	59.8	67	138.4	93.4	27	188.2	126.9	87	237.9	160.5
48	39.8	26.8	08	89.5	60.4	68	139.3	93.9	28	189.0	127.5	88	238.8	161.0
49	40.6	27.4	09	90.4	61.0	69	140.1	94.5	29	189.8	128.1	89	239.6	161.6
50	41.5	28.0	10	91.2	61.5	70	140.9	95.1	30	190.7	128.6	90	240.4	162.2
51	42.3	28.5	111	92.0	62.1	171	141.8	95.6	231	191.5	129.2	291	241.2	162.7
52	43.1	29.1	12	92.8	62.6	72	142.6	96.2	32	192.3	129.7	92	242.1	163.3
53	43.9	29.6	13	93.7	63.2	73	143.4	96.7	33	193.2	130.3	93	242.9	163.8
54	44.8	30.2	14	94.5	63.7	74	144.2	97.3	34	194.0	130.9	94	243.7	164.4
55	45.6	30.8	15	95.3	64.3	75	145.1	97.9	35	194.8	131.4	95	244.6	165.0
56	46.4	31.3	16	96.2	64.9	76	145.9	98.4	36	195.6	132.0	96	245.4	165.6
57	47.3	31.9	17	97.0	65.4	77	146.7	99.0	37	196.5	132.5	97	246.2	166.1
58	48.1	32.4	18	97.8	66.0	78	147.6	99.5	38	197.3	133.1	98	247.0	166.6
59	48.9	33.0	19	98.7	66.5	79	148.4	100.1	39	198.1	133.6	99	247.9	167.2
60	49.7	33.6	20	99.5	67.1	80	149.2	100.7	40	199.0	134.2	300	248.7	167.8
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 56 Deg.

Difference of Latitude and Departure for 35 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	50.0	35.0	121	99.1	69.4	181	148.2	103.8	241	197.4	138.2
2	01.6	01.1	62	50.8	35.6	22	99.9	70.0	82	149.1	104.4	42	198.2	138.8
3	02.5	01.7	63	51.6	36.1	23	100.7	70.5	83	149.9	105.0	43	199.0	139.4
4	03.3	02.3	64	52.4	36.7	24	101.6	71.1	84	150.7	105.5	44	199.8	139.9
5	04.1	02.9	65	53.2	37.3	25	102.4	71.7	85	151.5	106.1	45	200.6	140.5
6	04.9	03.4	66	54.1	37.9	26	103.2	72.3	86	152.4	106.7	46	201.5	141.1
7	05.7	04.0	67	54.9	38.4	27	104.0	72.8	87	153.1	107.2	47	202.3	141.7
8	06.6	04.6	68	55.7	39.0	28	104.8	73.4	88	154.0	107.8	48	203.1	142.2
9	07.4	05.2	69	56.5	39.6	29	105.6	74.0	89	154.8	108.4	49	203.9	142.8
10	08.2	05.7	70	57.3	40.1	30	106.5	74.6	90	155.6	109.0	50	204.7	143.4
11	09.0	06.3	71	58.1	40.7	131	107.3	75.1	191	156.4	109.5	251	205.6	143.9
12	09.8	06.9	72	59.0	41.3	32	108.1	75.7	92	157.2	110.1	52	206.4	144.5
13	10.6	07.5	73	59.8	41.9	33	108.9	76.3	93	158.1	110.7	53	207.2	145.1
14	11.5	08.0	74	60.6	42.4	34	109.7	76.8	94	158.9	111.3	54	208.0	145.7
15	12.3	08.6	75	61.4	43.0	35	110.6	77.4	95	159.7	111.8	55	208.8	146.2
16	13.1	09.2	76	62.2	43.6	36	111.4	78.0	96	160.5	112.4	56	209.6	146.8
17	13.9	09.7	77	63.	44.2	37	112.2	78.6	97	161.3	113.0	57	210.5	147.4
18	14.7	10.3	78	63.9	44.7	38	113.0	79.1	98	162.2	113.6	58	211.3	148.0
19	15.6	10.9	79	64.7	45.3	39	113.8	79.7	99	163.0	114.1	59	212.1	148.5
20	16.4	11.5	80	65.5	45.6	40	114.6	80.3	200	163.8	114.7	60	212.9	149.1
21	17.2	12.0	81	66.3	46.5	141	115.5	80.9	201	164.6	115.3	261	213.8	149.7
22	18.0	12.6	82	67.2	47.0	42	116.3	81.4	02	165.4	115.8	62	214.6	150.3
23	18.8	13.2	83	68.0	47.6	43	117.1	82.0	03	166.3	116.4	63	215.4	150.8
24	19.6	13.8	84	68.8	48.2	44	117.9	82.6	04	167.1	117.0	64	216.2	151.4
25	20.5	14.3	85	69.6	48.7	45	118.8	83.2	05	167.9	117.6	65	217.0	152.0
26	21.3	14.9	86	70.4	49.3	46	119.6	83.7	06	168.7	118.1	66	217.8	152.6
27	22.1	15.5	87	71.3	49.9	47	120.4	84.3	07	169.5	118.7	67	218.7	153.1
28	22.9	16.1	88	72.1	50.5	48	121.2	84.9	08	170.3	119.3	68	219.5	153.7
29	23.8	16.6	89	72.9	51.0	49	122.0	85.5	09	171.2	119.9	69	220.3	154.3
30	24.6	17.2	90	73.7	51.6	50	122.8	86.0	10	172.0	120.4	70	221.1	154.8
31	25.4	17.8	91	74.5	52.2	151	123.7	86.6	211	172.8	121.0	271	221.9	155.4
32	26.2	18.9	92	75.3	52.8	52	124.5	87.2	12	173.6	121.6	72	222.8	156.6
33	27.0	18.4	93	76.2	53.2	53	125.3	87.7	13	174.4	122.2	73	223.6	156.6
34	27.8	19.5	94	77.0	53.9	54	126.1	88.3	14	175.3	122.7	74	224.4	157.1
35	28.7	20.1	95	77.8	54.5	55	126.9	88.9	15	176.1	123.3	75	225.2	157.7
36	29.5	20.6	96	78.6	55.1	56	127.8	89.5	17	176.9	123.9	76	226.0	158.3
37	30.3	21.2	97	79.4	55.6	57	128.6	90.0	16	177.7	124.4	77	226.9	158.9
38	31.1	21.8	98	80.3	56.2	58	129.4	90.6	18	178.5	125.0	78	227.7	159.4
39	31.9	22.4	99	81.1	56.8	59	130.2	91.2	19	179.4	125.6	79	228.5	160.0
40	32.8	22.9	100	81.9	57.4	60	131.0	91.8	20	180.2	126.2	80	229.3	160.6
41	33.6	23.5	101	82.7	57.9	161	131.9	92.3	221	181.0	126.7	281	230.1	161.2
42	34.4	24.1	02	83.5	58.5	62	132.7	92.9	22	181.8	127.3	82	231.0	161.7
43	35.2	24.7	03	84.4	59.1	63	133.5	93.5	23	182.6	127.9	83	231.8	162.3
44	36.0	25.2	04	85.2	59.6	64	134.3	94.1	24	183.5	128.5	84	232.6	162.9
45	36.9	25.8	05	86.0	60.2	65	135.1	94.6	25	184.3	129.0	85	233.4	163.4
46	37.7	26.4	06	86.8	60.8	66	136.0	95.2	26	185.1	129.6	86	234.2	164.0
47	38.5	27.0	07	87.6	61.4	67	136.8	95.8	27	185.9	130.2	87	235.0	164.6
48	39.3	7.5	08	88.5	61.9	68	137.6	96.3	28	186.7	130.8	88	235.9	165.2
49	40.1	28.1	09	89.3	62.5	69	138.4	96.9	29	187.5	131.3	89	236.7	165.7
50	41.0	28.7	10	90.1	63.1	70	139.2	97.5	30	188.4	131.9	90	237.5	166.3
51	41.8	29.2	111	90.9	63.7	171	140.0	98.1	231	189.2	132.5	291	238.3	166.9
52	42.6	29.8	12	91.7	64.2	72	140.9	98.6	32	190.0	133.1	92	239.1	167.5
53	43.4	30.4	13	92.5	64.8	73	141.7	99.2	33	190.8	133.6	93	240.0	168.0
54	44.2	31.0	14	93.4	65.4	74	142.5	99.8	34	191.6	134.2	94	240.8	168.6
55	45.0	31.5	15	94.2	66.0	75	143.3	100.4	35	192.5	134.8	95	241.6	169.2
56	45.9	32.1	16	95.0	66.5	76	144.1	100.9	36	193.3	135.3	96	242.4	169.8
57	46.7	32.7	17	95.8	67.1	77	145.0	101.5	37	194.1	135.9	97	243.2	170.3
58	47.5	33.3	18	96.6	67.7	78	145.8	102.1	38	194.9	136.5	98	244.1	170.9
59	48.3	33.8	19	97.5	68.2	79	146.6	102.7	39	195.7	137.1	99	244.9	171.5
60	49.1	34.4	20	98.3	68.8	80	147.4	103.2	40	196.6	137.6	300	245.7	172.1
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 55 Deg.

Difference of Latitude and Departure for 36 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	61	49.3	35.9	121	97.9	71.1	181	146.4	106.4	241	195.0	141.7
2	01.6	01.2	62	50.2	36.4	22	98.7	71.7	82	147.2	107.0	42	195.8	142.2
3	02.4	01.8	63	51.0	37.0	23	99.5	72.3	83	148.0	107.6	43	196.6	142.8
4	03.2	02.4	64	51.8	37.6	24	100.3	72.9	84	148.9	108.2	44	197.4	143.4
5	04.0	02.9	65	52.6	38.2	25	101.1	73.5	8	149.7	108.7	45	198.2	144.0
6	04.9	03.5	66	53.4	38.8	26	101.9	74.1	86	150.5	109.3	46	199.0	144.6
7	05.7	04.1	67	54.2	39.4	27	102.7	74.7	87	151.3	109.9	47	199.8	145.2
8	06.5	04.7	68	55.0	40.0	28	103.6	75.2	88	152.1	110.5	48	200.6	145.8
9	07.3	05.3	69	55.8	40.6	29	104.4	75.8	89	152.9	111.1	49	201.4	146.2
10	08.1	05.9	70	56.6	41.1	30	105.2	76.4	90	153.7	111.7	50	202.2	146.8
11	08.9	06.5	71	57.4	41.7	131	106.0	77.0	191	154.5	112.3	251	203.1	147.5
12	09.7	07.1	72	58.2	42.3	32	106.8	77.6	92	155.3	112.9	52	203.9	148.1
13	10.5	07.6	73	59.1	42.9	33	107.6	78.2	93	156.1	113.4	53	204.7	148.7
14	11.3	08.2	74	59.9	43.5	34	108.4	78.8	94	156.9	114.0	54	205.5	149.3
15	12.1	08.8	75	60.7	44.1	35	109.2	79.4	95	157.8	114.6	55	206.3	149.9
16	12.9	09.4	76	61.5	44.7	36	110.0	79.9	96	158.6	115.2	56	207.1	150.5
17	13.8	10.0	77	62.3	45.3	37	110.8	80.5	97	159.4	115.8	57	207.9	151.1
18	14.6	10.6	78	63.1	45.8	38	111.6	81.1	98	160.2	116.4	58	208.7	151.7
19	15.4	11.2	79	63.9	46.4	39	112.5	81.7	99	161.0	117.0	59	209.5	152.2
20	16.2	11.8	80	64.7	47.0	40	113.3	82.3	200	161.8	117.6	60	210.3	152.8
21	17.0	12.3	81	65.5	47.6	141	114.1	82.9	201	162.6	1 8.1	261	211.1	153.4
22	17.8	12.9	82	66.3	48.2	42	114.9	83.5	02	163.4	118.7	62	212.0	154.0
23	18.6	13.5	83	67.1	48.8	43	115.7	84.1	03	164.2	119.3	63	212.8	154.6
24	19.4	14.1	84	68.0	49.4	44	116.5	84.6	04	165.0	119.9	64	213.6	155.2
25	20.2	14.7	85	68.8	50.0	45	117.3	85.2	05	165.8	120.5	65	214.4	155.8
26	21.0	15.3	86	69.6	50.6	46	118.1	85.8	06	166.7	121.1	66	215.2	156.4
27	21.8	15.9	87	70.4	51.1	47	118.9	86.4	07	167.5	121.7	67	216.0	156.9
28	22.7	16.5	88	71.2	51.7	48	119.7	87.0	08	168.3	122.3	68	216.8	157.5
29	23.5	17.0	89	72.0	52.3	49	120.5	87.6	09	169.1	122.8	69	217.6	158.1
30	24.3	17.6	90	72.8	52.9	50	121.3	88.2	10	169.9	123.4	70	218.4	158.7
31	25.1	18.2	91	73.6	53.5	151	122.2	88.8	211	170.7	124.0	271	219.2	159.3
32	25.9	18.8	92	74.4	54.1	52	123.0	89.3	12	171.5	124.6	72	220.0	159.9
33	26.7	19.4	93	75.2	54.7	53	123.8	89.9	13	172.3	125.2	73	220.9	160.5
34	27.5	20.0	94	76.0	55.3	54	124.6	90.5	14	173.1	125.8	74	221.7	161.1
35	28.3	20.6	95	76.9	55.8	55	125.4	91.1	15	173.9	126.4	75	222.5	161.6
36	29.1	21.2	96	77.7	56.4	56	126.2	91.7	16	174.7	127.0	76	223.3	162.2
37	29.9	21.7	97	78.5	57.0	57	127.0	92.3	17	175.6	127.6	77	224.1	162.8
38	30.7	22.3	98	79.3	57.6	58	127.8	92.9	18	176.4	128.1	78	224.9	163.4
39	31.6	22.9	99	80.1	58.2	59	128.6	93.5	19	177.2	128.7	79	225.7	164.0
40	32.4	23.5	100	80.9	58.8	60	129.4	94.0	20	178.0	129.3	80	226.5	164.6
41	33.2	24.1	101	81.7	59.4	161	130.2	94.6	221	178.8	129.9	281	227.3	165.2
42	34.0	24.7	02	82.5	60.0	62	131.1	95.2	22	179.6	130.5	82	228.1	165.8
43	34.8	25.3	03	83.3	60.5	63	131.9	95.8	23	180.4	131.1	83	228.9	166.3
44	35.6	25.9	04	84.1	61.1	64	132.7	96.4	24	181.2	131.7	84	229.8	166.9
45	36.4	26.5	05	84.9	61.7	65	133.5	97.0	25	182.0	132.3	85	230.6	167.5
46	37.2	27.1	06	85.8	62.3	66	134.3	97.6	26	182.8	132.8	86	231.4	168.1
47	38.0	27.6	07	86.6	62.9	67	135.1	98.2	27	182.6	133.4	87	232.2	168.7
48	38.8	28.2	08	87.4	63.5	68	135.9	98.7	28	184.5	134.0	88	233.0	169.5
49	39.6	28.8	09	88.2	64.1	69	136.7	99.3	29	185.3	134.6	89	233.8	169.9
50	40.5	29.4	10	89.0	64.7	70	137.5	99.9	30	186.1	135.2	90	234.6	170.5
51	41.3	30.0	111	89.8	65.2	171	138.3	100.5	231	186.9	135.8	291	235.4	171.0
52	42.1	30.6	12	90.6	65.8	72	139.1	101.1	32	187.7	136.4	92	236.2	171.6
53	42.9	31.2	13	91.4	66.4	73	140.0	101.7	33	188.5	137.0	93	237.0	172.2
54	43.7	31.7	14	92.2	67.0	74	140.8	102.3	34	189.3	137.5	94	237.8	172.8
55	44.5	32.3	15	93.0	67.6	75	141.6	102.9	35	190.1	138.1	95	238.7	173.4
56	45.3	32.9	16	93.8	68.2	76	142.4	103.5	36	190.9	138.7	96	239.5	174.0
57	46.1	33.5	17	94.7	68.8	77	143.2	104.0	37	191.7	139.3	97	240.3	174.6
58	46.9	34.1	18	95.5	69.4	78	144.0	104.6	38	192.5	139.9	98	241.1	175.2
59	47.7	34.7	19	96.3	69.9	79	144.8	105.2	39	193.3	140.5	99	241.9	175.7
60	48.5	35.3	20	97.1	70.5	80	145.6	105.8	40	194.2	141.1	300	242.7	176.3
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

for 54 Deg.

Difference of Latitude and Departure for 37 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	48.7	36.7	121	96.6	72.8	181	144.5	108.9	241	192.5	145.0
2	01.6	01.2	62	49.5	37.3	22	97.4	73.4	82	145.3	109.5	42	193.3	145.6
3	02.4	01.8	63	50.3	37.9	23	98.2	74.0	83	146.1	110.1	43	194.1	146.2
4	03.2	02.4	64	51.1	38.5	24	99.0	74.6	84	146.9	110.7	44	194.9	146.8
5	04.0	03.0	65	51.9	39.1	25	99.8	75.2	85	147.7	111.3	45	195.7	147.4
6	04.8	03.6	66	52.7	39.7	26	100.6	75.8	86	148.5	111.9	46	196.5	148.0
7	05.6	04.3	67	53.5	40.3	27	101.4	76.4	87	149.3	112.6	47	197.3	148.6
8	06.4	04.8	68	54.3	40.9	28	102.2	77.0	88	150.1	113.2	48	198.1	149.2
9	07.2	05.4	69	55.1	41.5	29	103.0	77.6	89	150.9	113.7	49	198.9	149.8
10	08.0	06.0	70	55.9	42.1	30	103.8	78.2	90	151.7	114.3	50	199.7	150.4
11	08.8	06.6	71	56.7	42.7	131	104.6	78.8	191	152.5	114.9	251	200.4	151.0
12	09.6	07.2	72	57.5	43.3	32	105.4	79.4	92	153.3	115.5	52	201.2	151.6
13	10.4	07.8	73	58.3	43.9	33	106.2	80.0	93	154.1	116.1	53	202.0	152.2
14	11.2	08.4	74	59.1	44.5	34	107.0	80.6	94	154.9	116.7	54	202.8	152.9
15	12.0	09.0	75	59.9	45.1	35	107.8	81.2	95	155.7	117.3	55	203.6	153.6
16	12.8	09.6	76	60.7	45.7	36	108.6	81.8	96	156.5	117.9	56	204.4	154.1
17	13.6	10.2	77	61.5	46.3	37	109.4	82.4	97	157.3	118.6	57	205.2	154.7
18	14.4	10.8	78	62.3	46.3	38	110.2	83.0	98	158.1	119.2	58	206.0	155.3
19	15.2	11.4	79	63.1	47.5	39	111.0	83.6	99	158.9	119.8	59	206.8	155.9
20	16.0	12.0	80	63.9	48.1	40	111.8	84.2	200	159.7	120.4	60	207.6	156.5
21	16.8	12.6	81	64.7	48.7	141	112.6	84.9	201	160.5	121.0	261	208.4	157.1
22	17.6	13.2	82	65.5	49.3	42	113.4	85.5	02	161.3	121.6	62	209.2	157.7
23	18.4	13.8	83	66.3	49.9	43	114.2	85.1	03	162.1	122.2	63	210.0	158.3
24	19.2	14.4	84	67.1	50.6	44	115.0	86.7	04	162.9	122.8	64	210.8	158.9
25	20.0	15.0	85	67.9	51.2	45	115.8	87.3	05	163.7	123.4	65	211.6	159.5
26	20.8	15.6	86	68.7	51.8	46	116.6	87.9	06	164.5	124.0	66	212.4	160.1
27	21.6	16.2	87	69.5	52.4	47	117.4	88.5	07	165.3	124.6	67	213.2	160.7
28	22.4	16.9	88	70.3	53.0	48	118.2	89.1	08	166.1	125.2	68	214.0	161.3
29	23.2	17.5	89	71.1	53.6	49	119.0	89.7	09	166.9	125.8	69	214.8	161.9
30	24.0	18.1	90	71.9	54.2	50	119.8	90.3	10	167.7	126.4	70	215.6	162.5
31	24.8	18.7	91	72.7	54.8	151	120.6	90.9	211	168.5	127.0	271	216.4	163.1
32	25.6	19.3	92	73.5	55.4	52	121.4	91.5	12	169.3	127.6	72	217.2	163.7
33	26.4	19.9	93	74.3	56.0	53	122.2	92.1	13	170.1	128.2	73	218.0	164.3
34	27.2	20.5	94	75.1	56.6	54	123.0	92.7	14	170.9	128.8	74	218.8	164.9
35	28.0	21.1	95	75.9	57.2	55	123.8	93.3	15	171.7	129.4	75	219.6	165.5
36	28.7	21.7	96	76.7	57.8	56	124.6	93.9	16	172.5	130.0	76	220.4	166.1
37	29.5	22.3	97	77.5	58.4	57	125.4	94.5	17	173.3	130.6	77	221.2	166.7
38	30.3	22.9	98	78.3	59.0	58	126.2	95.1	18	174.1	131.2	78	222.0	167.3
39	31.1	23.5	99	79.1	59.6	59	127.0	95.7	19	174.9	131.8	79	222.8	167.9
40	31.9	24.1	100	79.9	60.2	60	127.8	96.3	20	175.7	132.4	80	223.6	168.5
41	32.7	24.7	101	80.7	60.8	161	128.6	96.9	221	176.5	133.0	281	224.4	169.1
42	33.5	25.3	02	81.5	61.4	62	129.4	97.5	22	177.3	133.6	82	225.2	169.7
43	34.3	25.9	03	82.3	62.0	63	130.2	98.1	23	178.1	134.2	83	226.0	170.3
44	35.1	26.5	04	83.1	62.6	64	131.0	98.7	24	178.9	134.8	84	226.8	170.9
45	35.9	27.1	05	83.9	63.2	65	131.8	99.3	25	179.7	135.4	85	227.6	171.5
46	36.7	27.7	06	84.7	63.8	66	132.6	99.9	26	180.5	136.0	86	228.4	172.1
47	37.5	28.3	07	85.5	64.4	67	133.4	100.5	27	181.3	136.6	87	229.2	072.7
48	38.3	28.9	08	86.2	65.0	68	134.2	101.1	28	182.1	137.2	88	230.0	173.3
49	39.1	29.5	09	87.0	65.6	69	135.0	101.7	29	182.9	137.8	89	230.8	173.9
50	39.9	30.1	10	87.8	66.2	70	135.8	102.3	30	183.7	138.4	90	231.6	174.5
51	40.7	30.7	111	88.6	66.8	171	136.6	102.9	231	184.5	139.0	291	232.4	175.1
52	41.5	31.3	12	89.4	67.4	72	137.4	103.5	32	185.3	139.6	92	233.2	175.7
53	42.3	31.9	13	90.2	68.0	73	138.2	104.1	33	186.1	140.2	93	234.0	176.3
54	42.1	32.5	14	91.0	68.6	74	139.0	104.7	34	186.9	140.8	94	234.8	176.9
55	43.9	33.1	15	91.8	69.2	75	139.8	105.3	35	187.7	141.4	95	235.6	177.5
56	44.7	33.7	16	92.6	69.8	76	140.6	105.9	36	188.5	142.0	96	236.4	178.1
57	45.5	34.3	17	93.4	70.4	77	141.4	106.5	37	189.3	142.6	97	237.2	178.7
58	46.3	34.9	18	94.2	71.0	78	142.2	107.1	38	190.1	143.2	98	238.0	179.3
59	47.1	35.5	19	95.0	71.6	79	142.9	107.7	39	190.9	143.8	99	238.8	179.9
60	47.9	36.1	20	95.8	72.2	80	143.7	108.3	40	191.7	144.4	300	239.6	180.5
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 53 Deg.

Difference of Latitude and Departure for 38 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	48.1	37.6	121	95.3	74.5	181	142.6	111.4	241	189.9	148.4
2	01.6	01.2	62	48.9	38.2	22	96.1	75.1	82	143.4	112.1	42	190.7	149.0
3	02.4	01.8	63	49.6	38.8	23	96.9	75.7	83	144.2	112.7	43	191.5	149.6
4	03.2	02.5	64	50.4	39.4	24	97.7	76.3	84	145.0	113.3	44	192.2	150.2
5	03.9	03.1	65	51.2	40.0	25	98.5	77.0	85	145.8	113.9	45	193.0	150.8
6	04.7	03.7	66	52.0	40.6	26	99.3	77.6	86	146.5	114.5	46	193.8	151.5
7	05.5	04.3	67	52.8	41.3	27	100.1	78.2	87	147.3	115.1	47	194.6	152.1
8	06.3	04.9	68	53.6	41.9	28	100.9	78.8	88	148.1	115.8	48	195.4	152.7
9	07.1	05.5	69	54.4	42.5	29	101.6	79.4	89	148.9	116.4	49	196.2	153.3
10	07.9	06.2	70	55.2	43.1	30	102.4	80.0	90	149.7	117.0	50	197.0	153 9
11	08.7	06.8	71	55.9	43.7	131	103.2	80.7	191	150.5	117.6	251	197.8	154.5
12	09.5	07.4	72	56.7	44.3	32	104.0	81.3	92	151.3	118.2	52	198.5	155.2
13	10.2	08.0	73	57.5	44.9	33	104.8	81.9	93	152.1	118.8	53	199.3	155.8
14	11.0	08.6	74	58.3	45.6	34	105.6	82.5	94	152.9	119.4	54	200.1	156.4
15	11.8	09.2	75	59.1	46.2	35	106.4	83.1	95	153.6	120.1	55	200.9	157.0
16	12.6	09.9	76	59.9	46.8	36	107.2	83.7	96	154.4	120.7	56	201.7	157.6
17	13.4	10.5	77	60.7	47.4	37	107.9	84.4	97	155.2	121.3	57	202.5	158.2
18	14.2	11.1	78	61.5	48.0	38	108.7	85.0	98	156.0	121.9	58	203.3	158.9
19	15.0	11.7	79	62.2	48.6	39	109.5	85.6	99	156.8	122.5	59	204.1	159.5
20	15.8	12.3	80	63.0	49.3	40	110.3	86.2	200	157.6	123.1	60	204.9	160.1
21	16.3	12.9	81	63.8	49.9	141	111.1	86.8	201	158.4	123.8	261	205.6	160.7
22	17.3	13.5	82	64.6	50.5	42	111.9	87.4	02	159.2	124.4	62	206.4	161.3
23	18.1	14.2	83	65.4	51.1	43	112.7	88.0	03	159.9	125.0	63	207.2	161.9
24	18.9	14.8	84	66.2	51.7	44	113.5	88.7	04	160.7	125.6	64	208.0	162.5
25	19.7	15.4	85	67.0	52.3	45	114.2	89.3	05	161.5	126.2	65	208.8	163.2
26	20.5	16.0	86	67.8	53.0	46	115.0	89.9	06	162.3	126.8	66	209.6	163.8
27	21.3	16.6	87	68.5	53.6	47	115.8	90.5	07	163.1	127.4	67	210.4	164.4
28	22.1	17.2	88	69.3	54.2	48	116.6	91.1	08	163.9	128.1	68	211.2	165.0
29	22.9	17.9	89	70.1	54.8	49	117.4	91.7	09	164.7	128.7	69	211.9	165.6
30	23.6	18.5	90	70.9	55.4	50	118.2	92.4	10	165.5	129.3	70	212.7	166.2
31	24.4	19.1	91	71.7	56.0	151	119.0	93.0	211	166.2	129.9	271	213.5	166.9
32	25.2	19.7	92	72.5	56.6	52	119.8	93.6	12	167.0	130.5	72	214.3	167.5
33	26.0	20.3	93	73.3	57.3	53	120.5	94.2	13	167.8	131.1	73	215.1	168.1
34	26.8	20.9	94	74.1	57.9	54	121.3	94.8	14	168.6	131.8	74	215.9	168.7
35	27.6	21.5	95	74.9	58.5	55	122.1	95.4	15	169.4	132.4	75	216.7	169.3
36	28.4	22.2	96	75.6	59.1	56	122.9	96.0	16	170.2	133.0	76	217.5	169.9
37	29.2	22.8	97	76.4	59.7	57	123.7	96.7	17	171.0	133.6	77	218.2	170.5
38	29.9	23.4	98	77.2	60.3	58	124.5	97.3	18	171.8	134.2	78	219.0	171.2
39	30.7	24.0	99	78.0	61.0	59	125.3	97.9	19	172.5	134.8	79	219.8	171.8
40	31.5	24.6	100	78.8	61.6	60	126.1	98.5	20	173.3	135.5	80	220.6	172.4
41	32.3	25.2	101	79.6	62.2	161	126.9	99.1	221	174.1	136.1	281	221.4	173.0
42	33.1	25.9	02	80.4	62.8	62	127.6	99.7	22	174.9	136.7	82	222.2	173.6
43	33.9	26.5	03	81.2	63.4	63	128.4	100.4	23	175.7	137.3	83	223.0	174.2
44	34.7	27.1	04	81.9	64.0	64	129.2	101.0	24	176.5	137.9	84	223.8	174.9
45	35.5	27.7	05	82.7	64.6	65	130.0	101.6	25	177.3	138.5	85	224.5	175.5
46	36.2	28.3	06	83.5	65.3	66	130.8	102.2	26	178.1	139.1	86	225.3	176.1
47	37.0	28.9	07	84.3	65.9	67	131.6	102.8	27	178.9	139.8	87	226.1	176.7
48	37.8	29.6	08	85.1	66.5	68	132.4	103.4	28	179.6	140.4	88	226.9	177.3
49	38.6	30.2	09	85.9	67.1	69	133.2	104.1	29	180.4	141.0	89	227.7	177.9
50	39.4	30.8	10	86.7	67.7	70	133.9	104.7	30	181.2	141.6	90	228.5	178.6
51	40.2	31.4	111	87.5	68.3	171	134.7	105.3	231	182.0	142.2	291	229.3	179.2
52	41.0	32.0	12	88.2	69.0	72	135 5	105.9	32	182.8	142.8	92	230.1	179.8
53	41.8	32.6	13	89.0	69.6	73	136.3	106.5	33	183.6	143.5	93	230.9	180.4
54	42.5	33.2	14	89.8	70.2	74	137.1	107.1	34	184.4	144.1	94	231.6	181.0
55	43.3	33.9	15	90.6	70.8	75	137.9	107.7	35	185.2	144.7	95	232.4	181.6
56	44.1	34.5	16	91.4	71.4	76	138.7	108.4	36	185.9	145.3	96	233.2	182.2
57	44.9	35.1	17	92.2	72.0	77	139.5	109.0	37	186.7	145.9	97	234.0	182.9
58	45.7	35.7	18	93.0	72.7	78	140.2	109.6	38	187.5	146.5	98	234.8	183.5
59	46.5	36.3	19	93.8	73.3	79	141.0	110.2	39	188.3	147.2	99	235.6	184.1
60	47.3	36.9	20	94.5	73.9	80	141.8	110.8	40	189.1	147.8	300	236.4	184.7
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 52 Deg.

Difference of Latitude and Departure for 39 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.8	00.6	61	47.4	38.4	121	94.0	76.1	181	140.7	113.9	241	187.3	151.7
2	01.6	01.3	62	48.2	39.0	22	94.8	76.8	82	141.4	114.5	42	188.1	152.3
3	02.3	01.9	63	49.0	39.6	23	95.6	77.4	83	142.2	115.2	43	188.8	152.9
4	03.1	02.5	64	49.7	40.3	24	96.4	78.0	84	143.0	115.8	44	189.6	153.6
5	03.9	03.1	65	50.5	40.9	25	97.1	78.7	85	143.8	116.4	45	190.4	154.2
6	04.7	03.8	66	51.3	41.5	26	97.9	79.3	86	144.5	117.1	46	191.2	154.8
7	05.4	04.4	67	52.1	42.2	27	98.7	79.9	87	145.3	117.7	47	191.9	155.4
8	06.2	05.0	68	52.8	42.8	28	99.5	80.6	88	146.1	118.3	48	192.7	156.1
9	07.0	05.7	69	53.6	43.4	29	100.2	81.2	89	146.9	118.9	49	193.5	156.7
10	07.8	06.3	70	54.4	44.1	30	101.0	81.8	90	147.6	119.6	50	194.3	157.3
11	08.5	06.9	71	55.2	44.7	131	101.8	82.4	191	148.4	120.2	251	195.1	158.0
12	09.3	07.6	72	56.0	45.3	32	102.6	83.1	92	149.2	120.8	52	195.8	158.6
13	10.1	08.2	73	56.7	45.9	33	103.4	83.7	93	150.0	121.5	53	196.6	159.2
14	10.9	08.8	74	57.5	46.6	34	104.1	84.3	94	150.8	122.1	54	197.4	159.8
15	11.7	09.4	75	58.3	47.2	35	104.9	85.0	95	151.5	122.7	55	198.2	160.5
16	12.4	10.1	76	59.1	47.8	36	105.7	85.6	96	152.3	123.3	56	198.9	161.1
17	13.2	10.7	77	19.8	48.5	37	106.5	86.2	97	153.1	124.0	57	199.7	161.7
18	14.0	11.3	78	60.6	49.1	38	107.2	86.8	98	153.9	124.6	58	200.5	162.4
19	14.8	12.0	79	61.4	49.7	39	108.0	87.5	99	154.6	125.2	59	201.3	163.0
20	15.5	12.6	80	62.2	50.3	40	108.8	88.1	200	155.4	125.9	60	202.0	163.6
21	16.3	13.2	81	62.9	51.0	141	109.6	88.7	201	156.2	126.5	261	202.8	164.2
22	17.1	13.8	82	63.7	51.6	42	110.3	89.4	02	157.0	127.1	62	203.6	164.9
23	17.9	14.5	83	64.5	52.2	43	111.1	90.0	03	157.8	127.7	63	204.4	165.5
24	18.7	15.1	84	65.3	52.9	44	111.9	90.6	04	158.5	128.4	64	205.2	166.1
25	19.4	15.7	85	66.1	53.5	45	112.7	91.2	05	159.3	129.0	65	205.9	166.8
26	20.2	16.4	86	66.8	54.1	46	113.5	91.9	06	160.1	129.6	66	206.7	167.4
27	21.0	17.0	87	67.6	54.7	47	114.2	92.5	07	160.9	130.3	67	207.5	168.0
28	21.8	17.6	88	68.4	55.4	48	115.0	93.1	08	161.6	130.9	68	208.3	168.7
29	22.5	18.2	89	69.2	56.0	49	115.8	93.8	09	162.4	131.5	69	209.0	169.3
30	23.3	18.9	90	69.9	56.6	50	116.6	94.4	10	163.2	132.2	70	209.8	169.6
31	24.1	19.5	91	70.7	57.3	151	117.3	95.0	211	163.9	132.8	271	210.6	170.5
32	24.9	20.1	92	71.5	57.9	52	118.1	95.7	12	164.7	133.4	72	211.4	171.2
33	25.6	20.8	93	72.5	58.5	53	118.9	96.3	13	165.6	134.0	73	212.1	171.8
34	26.4	21.4	94	73.0	59.2	54	119.7	96.9	14	166.3	134.7	74	212.9	172.4
35	27.2	22.0	95	73.8	59.8	55	120.5	97.5	15	167.1	135.3	75	213.7	173.1
36	28.8	22.7	96	74.6	60.4	56	121.2	98.2	16	167.9	135.9	76	214.5	173.7
37	29.5	23.3	97	75.4	60.9	57	122.0	98.8	17	168.6	136.6	77	215.3	174.3
38	30.3	23.9	98	76.2	61.7	58	122.8	99.4	18	169.4	137.2	78	216.0	174.9
39	30.1	24.5	99	76.9	62.3	59	123.6	100.1	19	170.2	137.8	79	216.8	175.6
40	31.9	25.2	100	77.7	62.9	60	124.3	100.7	20	171.0	138.4	80	217.6	176.2
41	31.9	25.8	101	78.5	63.6	161	125.1	101.3	221	171.7	139.1	281	218.4	176.8
42	32.6	26.4	02	79.3	64.2	62	125.9	101.9	22	172.5	139.7	82	219.1	177.5
43	33.4	27.1	03	80.0	64.8	63	126.7	102.6	23	173.3	140.3	83	219.9	178.1
44	34.2	27.7	04	80.8	65.4	64	127.4	103.2	24	174.1	141.0	84	220.7	178.7
45	35.0	28.3	05	81.6	66.1	65	128.2	103.8	25	174.8	141.6	85	221.5	179.4
46	35.7	28.9	06	82.4	66.7	66	129.0	104.5	26	175.6	142.2	86	222.3	180.0
47	36.5	29.6	07	83.1	67.3	67	129.8	105.1	27	176.4	142.9	87	223.0	180.6
48	37.3	30.2	08	83.9	68.0	68	130.6	105.7	28	177.2	143.5	88	223.8	181.2
49	38.1	30.8	09	84.7	68.6	69	131.3	106.4	29	178.0	144.1	89	224.6	181.9
50	38.9	31.5	10	85.5	69.2	70	132.1	107.0	30	178.7	144.7	90	225.4	182.5
51	39.6	32.1	111	86.3	69.9	171	132.9	107.6	231	179.5	145.4	291	226.1	183.1
52	40.4	32.7	12	87.0	70.5	72	133.7	108.2	32	180.3	146.0	92	227.0	183.8
53	41.2	33.4	13	87.8	71.1	73	134.4	108.9	33	181.1	146.6	93	227.7	184.4
54	42.0	34.0	14	88.6	71.7	74	135.2	109.5	34	181.8	147.3	94	228.5	185.0
55	42.7	34.6	15	89.4	72.4	75	136.0	110.1	35	182.6	147.9	95	229.2	185.6
56	43.5	35.2	16	90.1	73.0	76	136.8	110.8	36	183.4	148.5	96	230.0	186.3
57	44.3	35.9	17	90.9	73.6	77	137.5	111.4	37	184.2	149.1	97	230.8	186.9
58	45.1	36.5	18	91.7	74.3	78	138.3	112.0	38	185.0	149.8	98	231.6	187.5
59	45.8	37.1	19	92.5	74.9	79	139.1	112.6	39	185.7	150.4	99	232.4	188.2
60	46.6	37.8	20	93.3	75.5	80	139.9	113.3	40	186.5	151.0	300	233.1	188.8
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 51 Deg.

Difference of Latitude and Departure for 40 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.6	61	46.7	39.2	121	92.7	77.8	181	138.6	116.4	241	184.6	154.9
2	01.5	01.3	62	47.5	39.9	22	93.4	78.4	82	139.4	117.0	42	185.4	155.6
3	02.3	01.9	63	48.3	40.5	23	94.2	79.1	83	140.2	117.7	43	186.1	156.2
4	03.1	02.6	64	49.0	41.1	24	95.0	79.7	84	140.9	118.3	44	186.9	156.9
5	03.8	03.2	65	49.8	41.8	25	95.7	80.4	85	141.7	118.9	45	187.7	157.5
6	04.6	03.9	66	50.6	42.4	26	96.5	81.0	86	142.5	119.6	46	188.4	158.1
7	05.4	04.5	67	51.3	43.1	27	97.3	81.6	87	143.2	120.2	47	189.2	158.8
8	06.1	05.1	68	52.1	43.7	28	98.0	82.3	88	144.0	120.9	48	190.0	159.4
9	06.9	05.8	69	52.9	44.4	29	98.8	82.9	89	144.8	121.5	49	190.7	160.1
10	07.7	06.4	70	53.6	45.0	30	99.6	83.6	90	145.5	122.1	50	191.5	160.7
11	08.4	07.1	71	54.4	45.6	131	100.3	84.2	191	146.3	122.8	251	192.3	161.4
12	09.2	07.7	72	55.2	46.3	32	101.1	84.9	92	147.1	123.4	52	193.0	162.0
13	10.0	08.4	73	55.9	46.9	33	101.9	85.5	93	147.8	124.1	53	193.8	162.6
14	10.7	09.0	74	56.7	47.6	34	102.6	86.1	94	148.6	124.7	54	194.6	163.3
15	11.5	09.6	75	57.4	48.2	35	103.4	86.8	95	149.4	125.4	55	195.3	163.9
16	12.3	10.3	76	58.2	48.9	36	104.2	87.4	96	150.1	126.0	56	196.1	164.6
17	13.0	10.9	77	59.0	49.5	37	104.9	88.1	97	150.9	126.6	57	196.9	165.2
18	13.8	11.6	78	59.7	50.1	38	105.7	88.7	98	151.7	127.3	58	197.6	165.9
19	14.6	12.2	79	60.5	50.8	39	106.5	89.4	99	152.4	127.9	59	198.4	166.5
20	15.3	12.9	80	61.3	51.4	40	107.2	90.0	200	153.2	128.6	60	199.2	167.1
21	16.1	13.5	81	62.0	52.1	141	108.0	90.6	201	154.0	129.2	261	199.9	167.8
22	16.9	14.1	82	62.8	52.7	42	108.8	91.3	02	154.7	129.9	62	200.7	168.4
23	17.6	14.8	83	63.6	53.4	43	109.5	91.9	03	155.5	130.5	63	201.4	169.1
24	18.4	15.4	84	64.3	54.0	44	110.3	92.6	04	156.3	131.1	64	202.2	169.7
25	19.2	16.1	85	65.1	54.6	45	111.1	93.2	05	157.0	131.8	65	203.0	170.4
26	19.9	16.7	86	65.9	55.3	46	111.8	93.9	06	157.8	132.4	66	203.7	171.0
27	20.7	17.4	87	66.6	55.9	47	112.6	94.5	07	158.6	133.1	67	204.5	171.6
28	21.4	18.0	88	67.4	56.6	48	113.4	95.1	08	159.3	133.7	68	205.3	172.3
29	22.2	18.6	89	68.2	57.2	49	114.6	95.8	09	160.1	134.4	69	206.0	172.9
30	23.0	19.3	90	68.9	57.9	50	114.9	96.4	10	160.9	135.0	70	206.8	173.6
31	23.7	19.9	91	69.7	58.5	151	115.7	97.1	211	161.6	135.6	271	207.6	174.2
32	24.5	20.6	92	70.5	59.1	52	116.4	97.7	12	162.4	136.3	72	208.3	174.8
33	25.3	21.2	93	71.2	59.8	53	117.2	98.4	13	163.2	136.9	73	209.1	175.5
34	26.0	21.9	94	72.0	60.4	54	118.0	99.0	14	163.9	137.6	74	209.9	176.1
35	26.8	22.5	95	72.8	61.1	55	118.7	99.6	15	164.7	138.2	75	210.6	176.8
36	27.6	23.1	96	73.5	61.7	56	119.5	100.3	16	165.4	138.8	76	211.4	177.4
37	28.3	23.8	97	74.3	62.4	57	120.3	100.9	17	166.2	139.5	77	212.2	178.1
38	29.1	24.4	98	75.1	63.0	58	121.0	101.6	18	167.0	140.1	78	212.9	178.7
39	29.9	25.1	99	75.8	63.6	59	121.8	102.2	19	167.7	140.8	79	213.7	179.3
40	30.6	25.7	100	76.6	64.3	60	122.6	102.8	20	168.5	141.4	80	214.5	180.0
41	31.4	26.4	101	77.4	64.9	161	123.3	103.5	221	169.3	142.1	281	215.2	180.6
42	32.2	27.0	02	78.1	65.6	62	124.1	104.1	22	170.0	142.7	82	216.	181.3
43	32.9	27.6	03	78.9	66.2	63	124.9	104.8	23	170.8	143.3	83	216.8	181.9
44	33.7	28.3	04	79.7	66.8	64	125.6	105.4	24	171.6	144.0	84	217.5	182.6
45	34.5	28.9	05	80.4	67.5	65	126.4	06.1	25	172.3	144.6	85	218.3	183.2
46	35.2	29.6	06	81.2	68.1	66	127.2	106.7	26	173.1	145.3	86	219.1	183.9
47	36.0	30.2	07	82.0	68.8	67	127.9	107.3	27	173.9	145.9	87	219.8	184.5
48	36.8	30.8	08	82.7	69.4	68	128.7	108.0	28	174.6	146.6	88	220.6	185.1
49	37.5	31.5	09	83.5	70.1	69	129.4	108.6	29	175.4	147.2	89	221.4	185.8
50	38.3	32.1	10	84.3	70.7	70	130.2	109.3	30	176.2	147.9	90	222.1	186.4
51	39.1	32.8	111	85.0	71.3	171	131.0	109.9	231	176.9	148.5	291	222.9	187.1
52	39.8	33.4	12	85.8	72.0	72	131.7	110.6	32	177.7	149.1	92	223.7	187.7
53	40.6	34.1	13	86.6	72.6	73	132.5	111.2	33	178.5	149.8	93	224.4	188.4
54	41.4	34.7	14	87.3	73.3	74	133.3	111.9	34	179.2	150.4	94	225.2	189.0
55	42.1	35.3	15	88.1	73.9	75	134.0	112.5	35	180.0	151.1	95	226.0	189.6
56	42.9	36.0	16	88.9	74.6	76	134.8	113.1	36	80.8	151.7	96	226.7	190.3
57	43.7	36.6	17	89.6	75.2	77	135.6	113.8	37	181.5	152.4	97	227.5	190.9
58	44.4	37.3	18	90.4	75.9	78	136.3	114.4	38	182.3	153.0	98	228.3	191.6
59	45.2	37.6	19	91.2	76.5	79	137.1	115.1	39	183.1	153.6	99	229.0	192.2
60	46.0	38.6	20	91.9	77.1	80	137.9	115.7	40	183.8	154.3	300	229.8	192.9
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

50 Deg.

Difference of Latitude and Departure for 41 Degrees.

Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep	Dist	Lat	Dep
1	00.8	00.7	61	46.0	40.0	121	91.3	79.4	181	136.6	118.7	241	181.9	158.1
2	01.5	01.3	62	46.8	40.7	22	92.1	80.0	82	137.4	119.4	42	182.6	158.7
3	02.3	02.0	63	47.5	41.3	23	92.8	80.7	83	138.1	120.0	43	183.4	159.4
4	03.0	02.6	64	48.3	42.0	24	93.6	81.3	84	138.9	120.7	44	184.2	160.0
5	03.8	03.3	65	49.1	42.6	25	94.3	82.0	85	139.6	121.4	45	184.9	160.7
6	04.5	03.9	66	49.8	43.3	26	95.1	82.6	86	140.4	122.0	46	185.7	161.4
7	05.3	04.6	67	50.6	44.0	27	95.8	83.3	87	141.1	122.7	47	186.4	162.0
8	06.0	05.2	68	51.3	44.6	28	96.6	84.0	88	141.9	123.3	48	187.2	162.7
9	06.8	05.9	69	52.1	45.3	29	97.4	84.6	89	142.6	124.0	49	187.9	163.3
10	07.5	06.6	70	52.8	45.9	30	98.1	85.3	90	143.4	124.6	50	188.7	164.0
11	08.3	07.2	71	53.6	46.6	131	98.9	85.9	191	144.2	125.3	251	189.4	164.6
12	09.1	07.9	72	54.3	47.2	32	99.6	86.6	92	144.9	125.9	52	190.2	165.3
13	09.8	08.5	73	55.1	47.9	33	100.4	87.2	93	145.7	126.6	53	190.9	166.0
14	10.6	09.2	74	55.8	48.5	34	101.1	87.9	94	146.4	127.3	54	191.7	166.6
15	11.3	09.8	75	56.6	49.2	35	101.9	88.6	95	147.2	127.9	55	192.5	167.3
16	12.1	10.5	76	57.4	49.9	36	102.6	89.2	96	147.9	128.6	56	193.2	167.9
17	12.8	11.2	77	58.1	50.5	37	103.4	89.9	97	148.7	129.2	57	194.0	168.6
18	13.6	11.8	78	58.9	51.2	38	104.2	90.5	98	149.4	129.9	58	194.7	169.2
19	14.3	12.5	79	59.6	51.8	39	104.9	91.2	99	150.2	130.5	59	195.5	169.9
20	15.1	13.1	80	60.4	52.5	40	105.7	91.8	200	150.0	131.2	60	196.2	170.5
21	15.8	13.8	81	61.1	53.1	141	106.4	92.5	201	151.7	131.8	261	197.0	171.2
22	16.6	14.4	82	61.9	53.8	42	107.2	93.1	02	152.5	132.5	62	197.7	171.9
23	17.4	15.1	83	62.6	54.4	43	107.9	93.8	03	153.2	133.2	63	198.5	172.5
24	18.1	15.7	84	63.4	55.1	44	108.7	94.5	04	154.0	133.8	64	199.2	173.2
25	18.9	16.4	85	64.2	55.8	45	109.4	95.1	05	154.7	134.5	65	200.0	173.8
26	19.6	17.1	86	64.9	56.4	46	110.2	95.8	06	155.5	135.1	66	200.8	174.5
27	20.4	17.7	87	65.7	57.1	47	110.9	96.4	07	156.2	135.8	67	201.5	175.1
28	21.1	18.4	88	66.4	57.7	48	111.7	97.1	08	157.0	136.4	68	202.3	175.8
29	21.9	19.0	89	67.2	58.4	49	112.5	97.7	09	157.7	137.1	69	203.0	176.4
30	22.6	19.7	90	67.9	59.0	50	113.2	98.4	10	158.5	137.7	70	203.8	177.1
31	23.4	20.3	91	68.7	59.7	151	114.0	99.0	211	159.2	138.4	271	204.5	177.8
32	24.2	21.0	92	69.4	60.4	52	114.7	99.7	12	160.0	139.1	72	205.3	178.4
33	24.9	21.6	93	70.2	61.0	53	115.5	100.4	13	160.8	139.7	73	206.0	179.1
34	25.7	22.3	94	70.9	61.7	54	116.2	101.0	14	161.5	140.4	74	206.8	179.7
35	26.4	23.0	95	71.7	62.3	55	117.0	101.7	15	162.3	141.0	75	207.5	180.4
36	27.2	23.6	96	72.5	63.0	56	117.7	102.3	16	163.0	141.7	76	208.3	181.0
37	27.9	24.3	97	73.2	63.6	57	118.5	103.0	17	163.6	142.3	77	209.1	181.7
38	28.7	24.9	98	74.0	64.3	58	119.2	103.6	18	164.5	143.0	78	209.8	182.4
39	29.4	25.6	99	74.7	64.9	59	120.0	104.3	19	165.3	143.6	79	210.6	183.0
40	30.2	26.2	100	75.5	65.6	60	120.8	105.0	20	166.0	144.3	80	211.3	183.7
41	30.9	26.9	101	76.2	66.3	161	121.5	105.6	221	166.8	145.0	281	212.1	184.3
42	31.7	27.6	02	77.0	66.9	62	122.3	106.3	22	167.5	145.6	82	212.8	185.0
43	32.5	28.2	03	77.7	67.6	63	123.0	106.9	23	168.3	146.3	83	213.6	185.6
44	33.2	28.9	04	78.5	68.2	64	123.8	107.6	24	169.1	146.9	84	214.3	186.3
45	34.0	29.5	05	79.2	68.9	65	124.5	108.2	25	169.8	147.6	85	215.1	186.9
46	34.7	30.2	06	80.0	69.5	66	125.3	108.9	26	170.6	148.2	86	215.8	187.6
47	35.5	30.8	07	80.8	70.2	67	126.0	109.5	27	171.3	148.9	87	216.6	188.3
48	36.2	31.5	08	81.5	70.8	68	126.8	110.2	28	172.1	149.6	88	217.4	188.9
49	37.0	32.1	09	82.3	71.5	69	127.5	110.9	29	172.8	150.2	89	218.1	189.6
50	37.7	32.8	10	83.0	72.2	70	128.3	111.5	30	173.6	150.9	90	218.9	190.2
51	38.5	33.5	111	83.8	72.8	171	129.1	112.2	231	174.3	151.5	291	219.6	190.9
52	39.2	34.1	12	84.5	73.5	72	129.8	112.8	32	175.1	152.2	92	220.4	191.5
53	40.0	34.8	13	85.3	74.1	73	130.6	113.5	33	175.8	152.8	93	221.1	192.2
54	40.8	35.4	14	86.0	74.8	74	131.3	114.1	34	176.6	153.5	94	221.9	192.8
55	41.5	36.1	15	86.8	75.4	75	132.1	114.8	35	177.4	154.1	95	222.6	193.5
56	42.3	36.7	16	87.5	76.1	76	132.0	115.4	36	178.1	154.8	96	223.4	194.2
57	43.0	37.4	17	88.3	77.7	77	133.6	116.1	37	178.9	155.5	97	224.2	194.8
58	43.8	38.0	18	89.1	77.4	78	134.3	116.8	38	179.6	156.1	98	224.9	195.5
59	44.5	38.7	19	89.8	78.1	79	135.1	117.4	39	180.4	156.8	99	225.7	196.1
60	45.3	39.4	20	90.6	78.7	80	135.8	118.1	40	181.1	157.4	300	226.4	196.8
Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat	Dist	Dep	Lat

H h

for 49 Deg.

Difference of Latitude and Departure for 42 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.7	00.7	61	45.3	40.8	121	89.9	80.9	181	134.5	121.1	241	179.0	161.2
2	01.5	01.3	62	46.1	41.5	22	90.6	81.6	82	135.2	121.8	42	179.8	161.9
3	02.2	02.0	63	46.8	42.1	23	91.4	82.3	83	135.9	122.4	43	180.5	162.6
4	03.0	02.7	64	47.5	42.8	24	92.1	83.0	84	136.7	123.1	44	181.3	163.2
5	03.7	03.3	65	48.3	43.5	25	92.9	83.6	85	137.3	123.8	45	182.0	163.9
6	04.5	04.0	66	49.0	44.2	26	93.6	84.3	86	138.2	124.4	46	182.7	164.6
7	05.2	04.7	67	49.8	44.8	27	94.3	85.0	87	138.9	125.1	47	183.5	165.2
8	05.9	05.4	68	50.5	45.5	28	95.1	85.6	88	139.7	125.8	48	184.2	165.9
9	06.7	06.0	69	51.3	46.2	29	95.8	86.3	89	140.4	126.4	49	185.0	166.6
10	07.4	06.7	70	52.0	46.8	30	96.6	87.0	90	141.1	127.1	50	185.7	167.2
11	08.2	07.4	71	52.7	47.5	131	97.3	87.6	191	141.9	127.8	251	186.5	167.9
12	08.9	08.0	72	53.5	48.2	32	98.1	88.3	92	142.6	128.4	52	187.2	168.6
13	09.7	08.7	73	54.2	48.8	33	98.8	89.0	93	143.4	129.1	53	187.9	169.3
14	10.4	09.4	74	55.0	49.5	34	99.5	89.6	94	144.1	129.8	54	188.7	169.9
15	11.1	10.0	75	55.7	50.2	35	100.3	90.3	95	144.9	130.5	55	189.4	170.6
16	11.9	10.7	76	56.5	50.8	36	101.0	91.0	96	145.6	131.1	56	190.2	171.3
17	12.6	11.4	77	57.2	51.5	37	101.8	91.7	97	146.3	131.8	57	190.9	171.9
18	13.4	12.0	78	57.9	52.2	38	102.5	92.3	98	147.1	132.5	58	191.7	172.6
19	14.1	12.7	79	58.7	52.9	39	103.3	93.0	99	147.8	133.1	59	192.4	173.3
20	14.9	13.4	80	59.4	53.5	40	104.0	93.7	200	148.6	133.8	60	193.1	173.9
21	15.6	14.0	81	60.2	54.2	141	104.7	94.3	201	149.3	134.5	261	193.9	174.6
22	16.3	14.7	82	60.9	54.9	42	105.5	95.0	02	150.1	135.1	62	194.6	175.3
23	17.1	15.4	83	61.7	55.5	43	106.2	95.7	03	150.8	135.8	63	195.4	175.9
24	17.8	16.1	84	62.4	56.2	44	107.0	96.3	04	151.5	136.5	64	196.1	176.6
25	18.6	16.7	85	63.1	56.9	45	107.7	97.0	05	152.3	137.1	65	196.9	177.3
26	19.3	17.4	86	63.9	57.5	46	108.5	97.7	06	153.0	137.8	66	197.6	177.9
27	20.1	18.1	87	64.6	58.2	47	109.2	98.3	07	153.8	138.5	67	198.3	178.6
28	20.8	18.7	88	65.4	58.9	48	109.9	99.0	08	154.5	139.1	68	199.1	179.3
29	21.5	19.4	89	66.1	59.5	49	110.7	99.7	09	155.3	139.8	69	199.8	180.0
30	22.3	20.1	90	66.9	60.2	50	111.4	100.4	10	156.0	140.5	70	200.6	180.6
31	23.0	20.7	91	67.6	60.9	151	112.2	101.0	211	156.7	141.2	271	201.3	181.3
32	23.8	21.4	92	68.3	61.5	52	112.9	101.7	12	157.5	141.8	72	202.1	182.0
33	24.5	22.1	93	69.1	62.2	53	113.7	102.4	13	158.2	142.5	73	202.8	182.6
34	25.3	22.7	94	69.8	62.9	54	114.4	103.0	14	159.0	143.2	74	203.5	183.3
35	26.0	23.4	95	70.6	63.6	55	115.1	103.7	15	159.7	143.8	75	204.3	184.0
36	26.7	24.1	96	71.3	64.2	56	115.9	104.4	16	160.5	144.1	76	205.0	184.6
37	27.5	24.8	97	72.1	64.9	57	116.6	105.0	17	161.2	145.2	77	205.8	185.3
38	28.2	25.4	98	72.8	65.6	58	117.4	105.7	18	161.9	145.8	78	206.5	186.0
39	29.0	26.1	99	73.5	66.2	59	118.1	106.4	19	162.7	146.5	79	207.3	186.6
40	29.7	26.8	100	74.3	66.9	60	118.9	107.0	20	163.4	147.2	80	208.0	187.3
41	30.5	27.4	101	75.0	67.6	161	119.6	107.7	221	164.2	147.8	281	208.7	188.0
42	31.2	28.1	02	75.8	68.2	62	120.3	108.4	22	164.9	148.5	82	209.5	188.7
43	31.9	28.8	03	76.5	68.9	63	121.1	109.0	23	165.7	149.2	83	210.2	189.3
44	32.7	29.4	04	77.3	69.6	64	121.8	109.7	24	166.4	149.9	84	211.0	190.0
45	33.4	30.1	05	78.0	70.2	65	122.6	110.4	25	167.1	150.5	85	211.7	190.7
46	34.2	30.8	06	78.7	70.9	66	123.3	111.0	26	167.9	151.2	86	212.5	191.3
47	34.9	31.4	07	79.5	71.6	67	124.1	111.7	27	168.6	151.9	87	213.2	192.0
48	35.7	32.1	08	80.2	72.3	68	124.8	112.4	28	169.4	152.5	88	213.9	192.7
49	36.4	32.8	09	81.0	72.9	69	125.5	113.1	29	170.1	153.2	89	214.7	193.3
50	37.1	33.5	10	81.7	73.6	70	126.3	113.7	30	170.9	153.9	90	215.4	194.0
51	37.9	34.1	111	82.5	74.3	171	127.0	114.4	231	171.6	154.5	291	216.2	194.7
52	38.6	34.8	12	84.2	74.9	72	127.8	115.1	32	172.3	155.2	92	216.9	195.3
53	39.4	35.5	13	83.9	75.6	73	128.5	115.7	33	173.1	155.9	93	217.7	196.0
54	40.1	36.1	14	84.7	76.3	74	129.3	116.4	34	173.8	156.5	94	218.4	196.7
55	40.9	36.8	15	85.4	76.9	75	130.0	117.1	35	174.6	157.2	95	219.1	197.4
56	41.6	37.5	16	86.2	77.6	76	130.7	117.7	36	175.5	157.9	96	219.9	198.0
57	42.3	38.1	17	86.9	78.3	77	131.5	118.4	37	176.1	158.5	97	220.6	198.7
58	43.1	38.8	18	87.7	78.9	78	132.2	119.1	38	176.8	159.7	98	221.4	199.4
59	43.8	39.5	19	88.4	79.6	79	133.0	119.7	39	177.5	159.9	99	222.1	200.5
60	44.6	40.1	20	89.1	80.2	80	133.7	120.4	40	178.3	160.6	300	222.9	200.8
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 48 Deg.

Difference of Latitude and Departure for 43 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.7	00.7	61	44.6	41.6	121	88.5	82.5	181	132.4	123.4	241	176.3	164.3
2	01.5	01.4	62	45.3	42.3	22	89.2	83.2	82	133.1	124.1	42	177.0	165.0
3	02.2	02.0	63	46.1	43.0	23	90.0	83.9	83	133.8	124.8	43	177.7	165.7
4	02.9	02.7	64	46.8	43.6	24	90.7	84.5	84	134.6	125.5	44	178.4	166.4
5	03.7	03.4	65	47.5	44.3	25	91.4	85.2	85	135.3	126.2	45	179.2	167.1
6	04.4	04.1	66	48.3	45.0	26	92.1	85.9	86	136.0	126.8	46	179.9	167.7
7	05.1	04.8	67	49.0	45.7	27	92.9	86.6	87	136.8	127.5	47	180.6	168.4
8	05.9	05.5	68	49.7	46.4	28	93.6	87.3	88	137.5	128.2	48	181.4	169.1
9	06.6	06.2	69	50.5	47.1	29	94.3	88.0	89	138.2	128.9	49	182.1	169.8
10	07.3	06.8	70	51.2	47.7	30	95.1	88.6	90	139.0	129.5	50	182.8	170.5
11	08.0	07.5	71	51.9	48.4	131	95.8	89.3	191	139.7	130.2	251	183.6	171.2
12	08.8	08.2	72	52.7	49.1	32	96.5	90.0	92	140.4	130.9	52	184.3	171.8
13	09.5	08.9	73	53.4	49.8	33	97.3	90.7	93	141.1	131.6	53	185.0	172.5
14	10.2	09.5	74	54.1	50.5	34	98.0	91.4	94	141.9	132.3	54	185.8	173.2
15	11.0	10.2	75	54.9	51.2	35	98.7	92.1	95	142.6	133.0	55	186.5	173.9
16	11.7	10.9	76	55.6	51.8	36	99.5	92.7	96	143.3	133.6	56	187.2	174.5
17	12.4	11.6	77	56.3	52.5	37	100.2	93.4	97	144.1	134.3	57	187.9	175.2
18	13.2	12.3	78	57.0	53.2	38	100.9	94.1	98	144.8	135.0	58	188.7	175.9
19	13.9	13.0	79	57.8	53.9	39	101.7	94.8	99	145.5	135.7	59	189.4	176.6
20	14.6	13.6	80	58.5	54.5	40	102.4	95.5	200	146.3	136.4	60	190.1	177.3
21	15.4	14.3	81	59.2	55.2	141	103.1	96.2	201	147.0	137.1	261	190.9	178.0
22	16.1	15.0	82	60.0	55.9	42	103.9	96.8	02	147.7	137.7	62	191.6	178.6
23	16.8	15.7	83	60.7	56.6	43	104.6	97.5	03	148.5	138.4	63	192.3	179.3
24	17.6	16.4	84	61.4	57.3	44	105.3	98.2	04	149.2	139.1	64	193.1	180.0
25	18.3	17.1	85	62.2	58.0	45	106.0	98.9	05	149.9	139.8	65	193.8	180.7
26	19.0	17.7	86	62.9	58.6	46	106.8	99.5	06	150.7	140.5	66	194.5	181.4
27	19.7	18.4	87	63.6	59.3	47	107.5	100.2	07	151.4	141.2	67	195.3	182.1
28	20.5	19.1	88	64.4	60.0	48	108.2	100.9	08	152.1	141.8	68	196.0	182.7
29	21.2	19.8	89	65.1	60.7	49	109.0	101.6	09	152.9	142.5	69	196.7	183.4
30	21.9	20.5	90	65.8	61.4	50	109.7	102.3	10	153.6	143.2	70	197.5	184.1
31	22.7	21.2	91	66.2	62.3	151	110.4	103.0	211	154.3	143.9	271	198.2	184.8
32	23.4	21.8	92	67.3	62.7	52	111.2	103.6	12	155.0	144.5	72	198.9	185.5
33	24.1	22.5	93	68.0	63.4	53	111.9	104.3	13	155.8	145.2	73	199.7	186.2
34	24.9	23.2	94	68.7	64.1	54	112.6	105.0	14	156.5	145.9	74	200.4	186.8
35	25.6	23.9	95	69.5	64.8	55	113.4	105.7	15	157.2	146.6	75	201.1	187.5
36	26.3	24.5	96	70.2	65.5	56	114.1	106.4	17	158.0	147.3	76	201.9	188.2
37	27.1	25.2	97	70.9	66.2	57	114.8	107.1	16	158.7	148.0	77	202.6	188.9
38	27.8	25.9	98	71.7	66.8	58	115.6	107.7	18	159.4	148.6	78	203.3	189.5
39	28.5	26.6	99	72.4	67.5	59	116.3	108.4	19	160.2	149.3	79	204.0	190.2
40	29.3	27.3	100	73.1	68.2	60	117.0	109.1	20	160.9	150.0	80	204.8	190.9
41	30.0	28.0	101	73.9	68.9	161	117.7	109.8	221	161.6	150.7	281	205.5	191.6
42	30.7	28.6	02	74.9	69.5	62	118.5	110.5	22	162.4	151.4	82	206.2	192.3
43	31.4	29.3	03	75.3	70.2	63	119.2	111.2	23	163.1	152.1	83	207.0	193.0
44	32.2	30.0	04	76.1	70.9	64	119.9	111.8	24	163.8	152.7	84	207.7	193.6
45	32.9	30.7	05	76.8	71.6	65	120.7	112.5	25	164.6	153.4	85	208.4	194.3
46	33.6	31.4	06	77.5	72.3	66	121.4	113.2	26	165.3	154.1	86	209.2	195.0
47	34.4	32.1	07	78.3	73.0	67	122.1	113.9	27	166.0	154.8	87	209.9	195.7
48	35.1	32.7	08	79.0	73.6	68	122.9	114.5	28	166.7	155.5	88	210.6	196.4
49	35.8	33.4	09	79.7	74.3	69	123.6	115.2	29	167.5	156.2	89	211.4	197.1
50	36.6	34.1	10	80.4	75.0	70	124.3	115.9	30	168.2	156.8	90	212.1	197.7
51	37.3	34.8	111	81.2	75.7	171	125.1	116.6	231	168.9	157.5	291	212.8	198.4
52	38.0	35.5	12	81.9	76.4	72	125.8	117.3	32	169.7	158.2	92	213.6	199.1
53	38.8	36.2	13	82.6	77.1	73	126.5	118.0	33	170.4	158.9	93	214.3	199.8
54	39.5	36.8	14	83.4	77.7	74	127.3	118.6	34	171.1	159.5	94	215.0	200.5
55	40.2	37.5	15	84.1	78.4	75	128.0	119.3	35	171.9	160.2	95	215.7	201.2
56	41.0	38.2	16	84.8	79.1	76	128.7	120.0	36	172.6	160.9	96	216.5	201.8
57	41.7	38.9	17	85.6	79.8	77	129.4	120.7	37	173.3	161.6	97	217.2	202.5
58	42.4	39.5	18	86.3	80.5	78	130.2	121.4	38	174.1	162.3	98	218.0	203.2
59	43.1	40.2	19	87.0	81.2	79	130.9	122.1	39	174.8	163.0	99	218.7	203.9
60	43.9	40.9	20	87.8	81.8	80	131.6	122.7	40	175.5	163.6	300	219.4	204.6
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 47 Deg.

Difference of Latitude and Departure for 44 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.7	00.7	61	43.9	42.4	121	87.0	84.0	181	130.2	125.7	241	173.4	167.4
2	01.4	01.4	62	44.6	43.1	22	87.8	84.7	82	130.9	126.4	42	174.1	168.1
3	02.2	02.1	63	45.3	43.8	23	88.5	85.4	83	131.6	127.1	43	174.8	168.8
4	02.9	02.8	64	46.0	44.5	24	89.2	80.1	84	132.4	127.8	44	175.5	169.5
5	03.6	03.5	65	46.8	45.1	25	89.9	86.8	85	133.1	128.5	45	176.2	170.2
6	04.3	04.2	66	47.7	45.8	26	90.6	87.5	86	133.8	129.2	46	176.9	170.9
7	05.0	04.9	67	48.2	46.5	27	91.4	88.2	87	134.5	129.9	47	177.7	171.6
8	05.8	05.6	68	48.9	47.2	28	92.1	88.9	88	135.2	130.6	48	178.4	172.3
9	06.5	06.3	69	49.6	47.9	29	92.8	89.6	89	135.9	131.3	49	179.1	173.0
10	07.2	06.9	70	50.4	48.6	30	93.5	90.3	90	136.7	132.0	50	179.8	173.6
11	07.9	07.6	71	51.1	49.3	131	94.2	91.0	191	137.4	132.7	251	180.5	174.3
12	08.6	08.3	72	51.8	50.0	32	94.9	91.7	92	138.1	133.4	52	181.3	175.0
13	09.4	09.0	73	52.5	50.7	33	95.7	92.4	93	138.8	134.1	53	182.0	175.7
14	10.1	09.7	74	53.2	51.4	34	90.4	93.1	94	139.5	134.8	54	182.7	176.4
15	10.8	10.4	75	53.9	52.1	35	97.1	93.8	95	140.3	135.4	55	183.4	177.1
16	11.5	11.1	76	54.7	52.8	36	97.8	94.5	96	141.0	136.1	56	184.1	177.8
17	12.2	11.8	77	55.4	53.5	37	98.5	95.2	97	141.7	136.8	57	184.9	178.5
18	12.9	12.5	78	56.1	54.2	38	99.3	95.9	98	142.4	137.5	58	185.6	179.2
19	13.7	13.2	79	56.8	54.9	39	100.0	96.5	99	143.1	138.2	59	186.3	179.9
20	14.4	13.9	80	57.5	55.6	40	100.7	97.2	200	143.9	138.9	60	187.0	180.6
21	15.1	14.6	81	58.3	56.3	141	101.4	97.9	201	144.6	139.6	261	187.7	181.3
22	15.8	15.3	82	59.0	57.0	42	102.1	98.6	02	145.3	140.3	62	188.4	182.0
23	16.5	16.0	83	59.7	57.7	43	102.9	99.3	03	146.0	141.0	63	189.2	182.7
24	17.3	16.7	84	60.4	58.3	44	103.6	100.0	04	146.7	141.7	64	189.9	183.4
25	18.0	17.4	85	61.1	59.0	45	104.3	190.7	05	147.5	142.4	65	190.6	184.1
26	18.7	18.1	86	61.9	59.7	46	105.0	101.4	06	148.2	143.1	66	191.3	184.8
27	19.4	18.8	87	62.6	60.4	47	105.7	102.1	07	148.9	143.8	67	192.1	185.5
28	20.1	19.4	88	63.3	61.1	48	106.5	102.8	08	149.6	144.5	68	192.8	186.1
29	20.9	20.1	89	64.0	61.8	49	107.2	103.5	09	150.3	145.2	69	193.5	186.8
30	21.6	20.8	90	64.7	62.5	50	107.9	104.2	10	151.1	145.9	70	194.2	187.5
31	22.3	21.5	91	65.5	63.2	151	108.6	104.9	211	151.8	146.6	271	194.9	188.2
32	23.0	22.2	92	66.2	63.9	52	109.3	105.6	12	152.5	147.3	72	195.6	188.9
33	23.7	22.9	93	66.9	64.6	53	110.1	106.3	13	153.2	147.9	73	196.4	189.6
34	24.5	23.6	94	67.6	65.3	54	110.8	107.0	14	153.9	148.6	74	197.1	190.3
35	25.2	24.3	95	68.3	66.0	55	111.5	107.7	15	154.6	149.3	75	197.8	191.0
36	25.9	25.0	96	69.1	66.7	56	112.2	108.4	16	155.4	150.0	76	198.5	191.7
37	26.6	25.7	97	69.8	67.4	57	112.9	109.1	17	156.1	150.7	77	199.2	192.4
38	27.3	26.4	98	70.5	68.1	58	113.1	109.7	18	156.8	151.4	78	200.0	193.1
39	28.1	27.1	99	71.2	68.8	59	114.4	110.4	19	157.5	152.1	79	200.7	193.8
40	28.8	27.8	100	71.9	69.5	60	115.1	111.1	20	158.2	152.8	80	201.4	194.5
41	29.5	28.5	101	72.6	70.2	161	115.8	111.8	221	159.0	153.5	281	202.1	195.2
42	30.2	29.2	02	73.4	70.8	62	116.5	112.5	22	159.7	154.2	82	202.8	195.9
43	30.9	29.9	03	74.1	71.5	63	117.2	113.2	23	160.4	154.9	83	203.6	196.6
44	31.6	30.6	04	74.8	72.2	64	118.0	113.9	24	161.1	155.6	84	204.3	197.3
45	32.4	31.3	05	75.5	72.9	65	118.7	114.6	25	161.8	156.3	85	205.0	198.0
46	33.1	32.0	06	76.2	73.6	66	119.4	115.3	26	162.6	157.0	86	205.7	198.7
47	33.8	32.6	07	77.0	74.3	67	120.1	116.0	27	163.3	157.7	87	206.4	199.3
48	34.5	33.3	08	77.7	75.0	68	120.8	116.7	28	164.0	158.4	88	207.2	200.0
49	35.2	34.0	09	78.4	75.7	69	121.6	117.4	29	164.7	159.1	89	207.9	200.7
50	36.0	34.7	10	79.1	76.4	70	122.3	118.1	30	165.4	159.8	90	208.6	201.4
51	36.7	35.4	111	79.8	77.1	171	123.0	118.8	231	166.2	160.4	291	209.3	202.1
52	37.4	36.1	12	80.6	77.8	72	123.7	119.5	32	166.9	161.1	92	210.0	202.8
53	38.1	36.8	13	81.3	78.5	73	124.4	120.2	33	167.6	161.8	93	210.8	203.5
54	38.8	37.5	14	82.0	79.2	74	125.2	120.9	34	168.3	162.5	94	211.5	204.2
55	39.6	38.2	15	82.7	79.9	75	125.9	121.6	35	169.0	163.2	95	212.2	204.9
56	40.3	38.9	16	83.4	80.6	76	126.6	122.2	36	169.8	163.9	96	212.9	205.6
57	41.0	39.6	17	84.2	81.3	77	127.3	122.9	37	170.5	164.6	97	213.6	206.3
58	41.7	40.3	18	84.9	82.0	78	128.0	123.6	38	171.2	165.3	98	214.4	207.0
59	42.4	41.0	19	85.6	82.7	79	128.8	124.3	39	171.9	166.0	99	215.1	207.7
60	43.2	41.7	20	86.3	83.4	80	129.5	125.0	40	172.6	166.7	300	215.8	208.4
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 46 Deg

Difference of Latitude and Departure for 45 Degrees.

Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep	Diſt	Lat	Dep
1	00.7	00.7	61	43.1	43.1	121	85.6	85.6	181	128.0	128.0	241	170.4	170.4
2	01.4	01.4	62	43.8	43.8	22	86.3	86.3	82	128.7	128.7	42	171.1	171.1
3	02.1	02.1	63	44.5	44.5	23	87.0	87.0	83	129.4	129.4	43	171.8	171.8
4	02.8	02.8	64	45.3	45.3	24	87.7	87.7	84	130.1	130.1	44	172.5	172.5
5	03.5	03.5	65	46.0	46.0	25	88.4	88.4	85	130.8	130.8	45	173.2	173.2
6	04.2	04.2	66	46.7	46.7	26	89.1	89.1	86	131.5	131.5	46	173.9	173.9
7	04.9	04.9	67	47.4	47.4	27	89.8	89.8	87	132.1	132.1	47	174.6	174.6
8	05.7	05.7	68	48.1	48.1	28	90.5	90.5	88	132.9	132.9	48	175.4	175.4
9	06.4	06.4	69	48.8	48.8	29	91.2	91.2	89	133.6	133.6	49	176.1	176.1
10	07.1	07.1	70	49.5	49.5	30	91.9	91.9	90	134.3	134.3	50	176.8	176.8
11	07.8	07.8	71	50.2	50.2	131	92.6	92.6	191	135.1	135.1	251	177.5	177.5
12	08.5	08.5	72	50.9	50.9	32	93.3	93.3	92	135.8	135.8	52	178.2	178.2
13	09.2	09.2	73	51.6	51.6	33	94.0	94.0	93	136.5	136.5	53	178.9	178.9
14	09.9	09.9	74	52.3	52.3	34	94.7	94.7	94	137.2	137.2	54	179.6	179.6
15	10.6	10.6	75	53.0	53.0	35	95.5	95.5	95	137.9	137.9	55	180.3	180.3
16	11.3	11.3	76	53.7	53.7	36	96.2	96.2	96	138.6	138.6	56	181.0	181.0
17	12.0	12.0	77	54.4	54.4	37	96.9	96.9	97	139.3	139.3	57	181.7	181.7
18	12.7	12.7	78	55.2	55.2	38	97.6	97.6	98	140.0	140.0	58	182.4	182.4
19	13.4	13.4	79	55.9	55.9	39	98.3	98.3	99	140.7	140.7	59	183.1	183.1
20	14.1	14.1	80	56.6	56.6	40	99.0	99.0	200	141.4	141.4	60	183.8	184.8
21	14.8	14.8	81	57.3	57.3	141	99.7	99.7	201	142.1	142.1	261	184.5	184.5
22	15.6	15.6	82	58.0	58.0	42	100.4	100.4	02	142.8	142.8	62	185.3	185.3
23	16.3	16.3	83	58.7	58.7	43	101.1	101.1	03	143.5	143.5	63	186.0	186.0
24	17.0	17.0	84	59.4	59.4	44	101.8	101.8	04	144.2	144.2	64	186.7	186.7
25	17.7	17.7	85	60.1	60.1	45	102.5	102.5	05	144.9	144.9	65	187.4	187.4
26	18.4	18.4	86	60.8	60.8	46	103.2	103.2	06	145.7	145.7	66	188.1	188.1
27	19.1	19.1	87	61.5	61.5	47	103.9	103.9	07	146.4	146.4	67	188.8	188.8
28	19.8	19.8	88	62.2	62.2	48	104.6	104.6	08	147.1	147.1	68	189.5	189.5
29	20.5	20.5	89	62.9	62.9	49	105.4	105.4	09	147.8	147.8	69	190.2	190.2
30	21.2	21.2	90	63.6	63.6	50	106.1	106.1	10	148.5	148.5	70	190.9	190.9
31	21.9	21.9	91	64.3	64.3	151	106.8	106.8	211	149.2	149.2	271	191.6	191.6
32	22.6	22.6	92	65.1	65.1	52	107.5	107.5	12	149.9	149.9	72	192.3	192.3
33	23.3	23.3	93	65.8	65.8	53	108.2	108.2	13	150.6	150.6	73	193.0	193.0
34	24.0	24.0	94	66.5	66.5	54	108.9	108.9	14	151.3	151.3	74	193.7	193.7
35	24.7	24.7	95	67.2	67.2	55	109.6	109.6	15	152.0	152.0	75	194.4	194.4
36	25.5	25.5	96	67.9	67.9	56	110.3	110.3	16	152.7	152.7	76	195.2	195.2
37	26.2	26.2	97	68.6	68.6	57	111.0	111.0	17	153.4	153.4	77	195.9	195.9
38	26.9	26.9	98	69.3	69.3	58	111.7	111.7	18	154.1	154.1	78	196.6	196.6
39	27.6	27.6	99	70.0	70.0	59	112.4	112.4	19	154.8	154.8	79	197.3	197.3
40	28.3	28.3	100	70.7	70.7	60	113.1	113.1	20	155.6	155.6	80	198.0	198.0
41	29.0	29.0	101	71.4	71.4	161	113.8	113.8	221	156.3	156.3	281	198.7	198.7
42	29.7	29.7	02	72.1	72.1	62	114.5	114.5	22	157.0	157.0	82	199.4	199.4
43	30.4	30.4	03	72.8	72.8	63	115.3	115.3	23	157.7	157.7	83	200.1	200.1
44	31.1	31.1	04	73.5	73.5	64	116.0	116.0	24	158.4	158.4	84	200.8	200.8
45	31.8	31.8	05	74.2	74.2	65	116.7	116.7	25	159.1	159.1	85	201.5	201.5
46	32.5	32.5	06	74.9	74.9	66	117.4	117.4	26	159.8	159.8	86	202.2	202.2
47	33.2	33.2	07	75.7	75.7	67	118.1	118.1	27	160.5	160.5	87	202.9	202.9
48	33.9	33.9	08	76.4	76.4	68	118.8	118.8	28	161.2	161.2	88	203.6	203.6
49	34.6	34.6	09	77.1	77.1	69	119.5	119.5	29	161.9	161.9	89	204.3	204.3
50	35.4	35.4	10	77.8	77.8	70	120.2	120.2	30	162.6	162.6	90	205.1	205.1
51	36.1	36.1	111	78.5	78.5	171	120.9	120.9	231	163.3	163.3	291	205.8	205.8
52	36.8	36.8	12	79.2	79.2	72	121.6	121.6	32	164.0	164.0	92	206.5	206.5
53	37.5	37.5	13	79.9	79.9	73	122.3	122.3	33	164.7	164.7	93	207.2	207.2
54	38.2	38.2	14	80.6	80.6	74	123.0	123.0	34	165.5	165.5	94	207.9	207.9
55	38.9	38.9	15	81.3	81.3	75	123.7	123.7	35	166.2	166.2	95	208.6	208.6
56	39.6	39.6	16	82.0	82.0	76	124.4	124.4	36	166.9	166.9	96	209.3	209.3
57	40.3	40.3	17	82.7	82.7	77	125.2	125.2	37	167.6	167.6	97	210.0	210.0
58	41.0	41.0	18	83.4	83.4	78	125.9	125.9	38	168.3	168.3	98	210.7	210.7
59	41.7	41.7	19	84.1	84.1	79	126.6	126.6	39	169.0	169.0	99	211.4	211.4
60	42.4	42.4	20	84.8	84.8	80	127.3	127.3	40	169.7	169.7	300	212.1	212.1
Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat	Diſt	Dep	Lat

for 45 Deg.

South Coast of England, bounding the Britiſh Channel, and the oppoſite Coaſt of France, with the Latitudes and Longitudes, and Time of High Water; and the Time the Current runs in the Offing of ſome Places.

Engliſh Coaſt	H. W.		Lat.		Long.	
	H.	M.	D.	M.	D.	M.
North Foreland	10	30	51	25N.	1	34E.
Ramſgate	10	30	51	20	1	30
Deal	10	30	51	14	1	30
The Downs	10	30	51	25	1	35
South Foreland	10	30	51	12	1	30
Dover	10	30	51	7	1	22
Rye	11	15	51	3	0	50
Dungeneſs	10	30	50	57	1	6
Haſtings	11	0	50	52	0	36
Beachyhead	9	45	50	44	0	20
Brighthelmſtone	10	0	50	50	0	0
Arundel	9	0	50	50	0	30W
Shoreham	9	45	50	51	0	15
The Owers	9	0	50	39	0	40
Chicheſter Harbo.	11	30	50	47	0	55
Portſmouth	11	45	50	48½	1	4
Spithead Road	11	15	50	48	1	6
Cowes, I. of Wight	10	15	50	46	1	16
St. Helen's Road	9	0	50	43	0	55
Bembridge, I. Wi.	10	15	50	40	0	52
Dunnoſe	10	30	50	35	1	21
Catherine's Point	9	0	50	34	1	14
Needles 10h. 15m	8	15	50	42	1	34
Chriſt Church	9	0	50	46	1	44
Pool, Dorſetſhire	6	45	50	46	1	54
Peveral Point	8	45	50	36	1	50
St. Alban's Head	8	30	50	35	2	0
Weymouth	7	30	50	38	2	30
Bill of Portland	7	15	50	31	2	30
Exmouth Bar	5	45	50	38	3	30
Exeter	0	0	50	45	3	39
Torbay	5	15	50	28	3	38
Dartmouth	5	15	50	25	3	36
Start Point	6	45	50	9	3	45
Praul	0	0	50	15	3	53
Plymouth	6	0	50	25	4	20
Eddiſtone	5	30	50	9	4	19
Ram Head	7	30	50	21	4	20
Falmouth	5	30	50	10	5	2
Lizard Point	4	30	49	57	5	14
Mount's Bay	6	0	50	5	5	45
Land's End	7	30	50	6	6	0
Scilly I.	6	30	50	6	6	49
St. Agneſs Lights			49	56	6	41
St. Marie's I.	6	30	49	58	6	40
Aldern. & Caſkets	12	0	49	48	2	10
Guern. I. & Sarkl.	1	30	49	30	2	47
Jerſey I.		30	49	7		6

French Coaſt.	H. W.		Lat.		Long.	
	H.	M.	D.	M.	D.	M.
Dunkirk	12	0	51	5N.	2	27E.
Graveline	11	43	51	0	2	12
Calais	11	30	50	57	1	56
Cape Criſnez	11	30	50	50	1	40
Boulogne	10	30	50	43	1	42
Abbeville	10	30	50	7	1	56
Dieppe	10	30	49	55	1	9
Havre de Grace	9	0	49	33	0	17
Rouen up R. Syne	1	15	49	27	1	15
Sine R. Mouth	9	0	49	30	0	10
Caen	9	0	49	11	0	16W
C. Barfleur	7	30	49	40	1	12
Cherburg	7	10	49	38	1	34
C. de la Hague	12	0	49	45	1	55
Coutance	6	0	49	2	1	30
Granville	6	0	48	50	1	32
Avranches	6	0	48	41	1	18
St. Malo	6	0	48	39	1	57
Seven Iſlands		0	48	48	3	25
Iſle de Bas	3	45	48	45	3	55
Breſt	3	45	48	23	4	26

The Current in the Mid. Channel runs N. E. about 1 H. 30 M. after High Water; and it runs off Dungeneſs 4 H. to 4 and an Half Hours; in the Downs 4 Hours; and Eaſt in the King's Channel 3 Hours after High Water.

The following Table ſhews the Time of High Water at the principal Headlands, &c. in the Channel, on Full and Change Days, and the Time the Current runs after High Water.

High Water			The Current runs after H. W		And the Time the Current has done running.	
	H.	M.	H.	M.	H.	M.
At the Lizard at	4	30	3	0	7	30
Off the Eddiſtone	5	30	3	0	8	30
Off the Start	6	0	2	30	8	30
Off Portland	7	15	3	0	10	15
Off I. of Wight	8	14	3	15	11	30
Off Arundel and Shoreham	9	15	1	15	10	30
Off Beachy	9	45	1	15	11	0
Off Dungeneſs	10	30	4	0	2	30

Note, H. W. ſtands for High Water; R. for River; I. for Iſland; P. for Point; and C. for Cape.——The Longitude reckoned from the Meridian of London.

The Times ſet down here, are when it is H. W. at the Ports, and not when the Currents have done running in the Offing; many of which I have collected from different Authors, &c. and therefore cannot affirm that they are all certain.

It were to be wiſhed, that every Mariner would obſerve the Times of H. W. at the different Ports he comes to, and in the Offing, and communicate them to the Public, that theſe Tables might be brought to Perfection. But the Latitudes and Longitudes, it is preſumed, will be here more correct than any hitherto publiſhed.

The Eaſt Coaſt of Britain and Places up Rivers.

	H. W. H. M.	Lat. D. M.	Long. M. D.
R. Thames, Lond.	3 0	51 32N.	0 0E
——— Graveſend	1 30	51 23	0 25
R. Medway, - Rocheſter, and Chatham	0 45	51 25	0 36
Sheerneſs -	12 0	51 31	0 50
The Nore -	12 0	51 34	1 6
Margate - -	11 0	51 25	1 20
King's Channel along the Swin	10 30	51 38	1 16
Runs	12 0		
Kentiſh Knock the Eaſtermoſt Sand in the King's Channel, N. of the Downs.	10 30		1 40
The Cur. runs till	1 0	0 0	0 0
Harwich 10h. 30m.	11 15	51 58	1 20
Ipſwich 11 -	11 0	52 8	1 15
Sole Bay -	9 30	52 24	1 50
Leſtoff 10 -	9 0	52 36	1 52
Tower Lights -	8 0	52 48	1 44
WintertonneſsLight		52 50	
Orfordneſs -	9 45	52 10	1 20
Yarmouth -	9 30	52 45	1 50
Ditto Road -	8 15		
Cromer Lights	7 30	52 45	1 14
Wells - -	6 15	53 4	1 0
Lynn, in Norfolk	6 0	52 50	0 22
Boſton - -	6 0	53 10	0 12
Mouth of River Humber the Spurn	5 15	53 30	0 16
R. Humber, Hull	6 0	53 45	0 12W
Bridlington Bay	3 45	54 6	0 0
Flamboroughhead	4 0	54 10	0 5E
Scarborough	3 45	54 18	0 12W
Robinhood Bay	3 45	54 22	1 17
Whitby - -	3 0	54 30	1 22
R. Tee's Mouth	3 0	54 40	1 0
——— Stockton	5 15	54 37	1 10
Hartlepool -	3 0	54 45	1 0
Sunderland -	8 0	54 56	1 10
North Shields	3 0	55 2	1 12
Newcaſtle -	5 15	55 2	1 26
Tinmouth Caſtle	3 0	55 4	1 12
Sunderland Point	3 0	55 32	1 24
Holy Iſland -	2 45	55 40	1 34
Berwick -	2 30	55 46	1 43
St. Abb's Head	2 0	55 54	1 50
Dunbar - -	2 30	55 58	2 18
Edinburg - -	4 30	55 58	3 18
Buckaneſs -	3 0	57 30	1 35
Aberdeen - -	0 45	57 7	1 52
Cathneſs Poiut	9 0	58 46	3 17

Iſles of Orkney and Shetland.

	H. M. H. W.	Lat. D. M	Long. D. M.
Pickland Skerries	3 0	58 54N.	3 0W
Pomona chief Iſle	3 0	59	3 20
North Ronalſa, the Northermoſt of them	3 0	59	2 45
SHETLAND Iſles			
Fair Iſle - -	3	59 30	2 20
Foule Iſle -	3	60 12	2 40
Sella Iſle -	3	60 35	2 24
Balta Iſle - -	3	60 31	1 0
Sears Iſle - -	3	60 15	1 4

• *Weſt Coaſt of Scotland.*

Cape Wrath	0 30	58 40N.	4 50W
Iſle of Lewis		58 30	6 30
I. of Sky, N.		57 45	6 35
Douglas I. of Man	10 20	54 10	4 24

Weſt Coaſt of England.

Whitehaven	9 45	54 35N	3 44W
St. Bee's Head	9 45	54 30	3 45
Lancaſter - -	10 0	54 8	3 6
Cheſter, or Weſt Cheſter River Dee	11 30	53 12	3 11
Parkgate - -	11 0	53 17	3 15
Liverpool -	11 0	53 22	3 18
Skerries Lighthouſe		53 24	4 38
Holyhead - -	11 30	53 19	4 40
Barſey or Barſly I.	3 0	52 44	4 50
St. David's Head	6 0	51 55	5 10
St. Bride's Bay	5 0	51 56	5 6
Greſholm Iſle	5 30	51 50	5 15
TheSmall'sLighthouſe		51 45	5 00
Milford Haven	6 0	51 45	5 0
Swanſea - -	6 0	51 40	3 50
Mouth of the Severn, Flathome's	6 0	51 22	3 10
Briſtol - -	7 4	51 26	2 40
Lundy Iſland -	5 15	51 10	4 50
Hartland Point	4 33	51 8	4 30
C. Cornwall 5h. 30.	7 0	50 10	5 50
Land's End 5 30.	7 30	50 6	6 0

The Coaſt of Ireland.

Old Head Kinſale		51 31	8 47
Kinſale Harbour		51 35	8 46
Cork Harbour		51 42	8 35
Youghall Bay		51 52	8 17
Dungarvon Bay		52 1	7 45
Waterford Haven	5 0	52 3	7 43
Saltees Rocks -	5 30	52 3	7
Cernfore Point		52 11	6 51
Tuſker Rocks -		52 11	6 45
Wexford Haven		52 21	6 52

	H.W. H.M.	Lat D. M.	Long. D. M.
Mizen Head -		52 52N	6 39W
WicklowLighthouſe		52 58	6 38
Codlingridge Buoys		53 8	6 32
Dublin Bay -	10 30	53 20	6 43
Hoth Lighthouſe		53 22	6 41
Lainbay Iſland		53 28	6 40
St. Patrick's Iſland		53 35	6 35
Drogheda Bar		53 44	6 42
Dundalk Bay		53 57	6 42
Carlingford Bay		54 0	6 37
Newry - -		54 5	6 42
Strangford Bay		54 17	6 15
Mew Lighthouſe		54 41	6 4
Belfaſt - -	10 15	54 40	6 20
Larn Harbour		54 53	6 14
The Maids off Ditto		54 58	6 12
Fair Head -		55 15	6 30
Raughlan Iſland	10 15	55 20	6 36
Fortruſh - -		55 15	7 0
Seven Heads -	3 0	51 36	8 22
Cape Clear -	3 15	51 22	9 46
Faſtnet Rock -	3 0	52 13	9 51
Crook Haven -	3 0	51 19	9 55
Mizen Head	3 0	51 17	10 1
Dun Manus Bay		51 28	10 1
Sheep's Head	3 0	51 24	10 2
Bantree Bay -		51 26	10 2
The Cow and Calf		51 26	10 22
Kennare River	3 0	51 37	10 14
The Skelling Rocks		51 40	10 34
The Blaſkets		51 58	10 36
Ballingſkellings Bay	3 15	51 42	9 14
Bray Head -	3 30	51 47	10 30
Dingle Bay	3 30	51 55	10 26
Ferriters Iſles -	3 30	51 55	10 36
Smerwick Harbour	3 30	52 5	10 28
Brandon Head Bay		52 10	10 23
Carry Head -		52 15	10 13
Loop Head, or Mouth of the Shannon	3 45	52 23	10 14
Gallway Bay -	6 30	53 10	9 30
Sline Head - -	7 0	53 20	10 40
Black Rocks -		53 55	10 47
Broad Haven -	7 0	54 6	10 38
Dunnagall Bay -		54 30	8 45
Cape Telling		54 38	9 23
Tory Iſland -		55 9	8 50
North Cape -		55 15	8 30
Entrance of Londonderry Lough	7 30	55 12	7 30
Mouth of the Bann		55 10	7 17
Carrickfergus Bay		54 45	6 10
Iſle of Arran -		55 26	6 2

The Weſt Coaſt of France.

Iſle of Uſhant -	5 13	48 30N.	5 5W
Breſt - -	3 45	48 23	4 26
Penmark Point	3 0	47 50	4 20
Bell Iſle - -	3 30	47 21	3 13
Angers - -	0 0	47 28	0 34
Rochelle - -	3 45	46 10	1 11
Nantz - -	0 0	47 13	1 30
Bourdeaux -	3 0	44 50	0 30
Bayonne - -	3 30	43 29	1 25

Weſt Coaſt of Spain and Portugal.

Cape Ortegal -	3 0	43 47	7 44W
Cape Pinas - -	3 0	43 51	5 47
C. Corunna -	3 0	43 56	9 10
C. Prior - -	0 0	43 38	8 25
C. Finiſtere -	3 15	43 13	9 10
Ville del Conde		41 11	8 20
Oporto, or PortaPort	3 15	41 10	8 22
Bayonna - -	4 45	42 3	8 45
Vigo - -		42 14	8 22
Burlings -		39 30	9 20
Liſbon - -	2 45	38 42	9 3
C. Roxent - -	1 0	38 40	9 30
C. St. Vincent		37 2	8 55
Cadiz 6 - -	4 30	36 31	6 7
Cape Treſalgar		36 10	5 55
Gibraltar -	2 0	36 6	4 53

The Coaſts on the Main Continent within the Straits.

Places Names.	Lat. D. M.	Long. D. M.
Malaga - - -	36 42N.	4 0W
Cape de Gat - -	36 40	1 40
Cape Paul - -	38 15	0 1
Alicant - -	38 35	0 15
Cape St. Martin -	38 46	0 30E.
Valencia - -	39 35	0 0
Barcelona - -	41 26	2 18
Marſeilles - -	43 18	5 27
Toulon - -	43 7	6 3
Genoa - -	44 25	8 40
Leghorn - -	43 28	10 30
Civita Vecchia -	42 5	11 51
Rome - -	41 54	12 34
Naples - -	40 51	14 20
Cape Spartevento -	37 55	16 45
Cape Colonne - -	38 56	18 1
Gallipoli - -	40 23	18 23
Cape St. Maria, or Lucia	39 45	19 0
Ancona - -	43 40	14 10
Venetio, or Venice -	45 25	12 40
Zara - -	44 30	16 35
Raguſa - -	42 10	18 50
Cattaro - -	42 47	19 17
La Valona - -	40 35	21 15
Lepanto - -	38 20	22 42
Cape Matagan, or Caliga	36 33	22 41
Cape St. Angelo, or Angule	36 32	23 56
Athens - -	38 5	23 57
Cape Martelo South Point of Negropont	38 7	25 3
Cape Colom, or Colonne	37 45	24 42
Salonica - -	40 41	23 13
Cape Monte Sancto -	40 26	25 2
Gallipoli - -	40 53	27 20
Conſtantinople -	40 39	28 57
Cape Barbador, or Baba	39 30	26 30
Smyrna - -	38 28	27 25
Cape Barbernola, or Blanc	38 9	26 32
Epheſus - -	38 1	27 53
Antiochetta - -	36 10	36 17
Scandaroon; or Alexandretta - -	36 34	36 30

Places Names.		Lat. D. M.	Long. D. M.
Antioch		36 11N.	36 18 E
Aleppo		35 42	37 24
Tortoſa		35 4	36 20
Tripoli		34 48	36 5
Joppa, or Jaffa		32 45	36 0
Jeruſalem		31 51	35 25
Alexandria		31 10	30 19
Cape Ruſata		32 41	21 25
Cape Meſurata		32 21	16 17
Tripola		32 54	13 10
Suſa		35 53	10 34
Cape Bona		37 3	11 4
Tunis		36 50	10 17
Bona		37 5	8 19
Seven Capes		37 15	7 0
Gigeri		37 14	6 15
Cape Tidelles, or Delly's		37 15	4 18
Algier		36 50	2 19
Cape Tenes		36 45	1 50
Orain		36 2	26
Cape Trees Forcas		35 30	2 4W
Ceuta		35 54	4 45
Tangier		35 52	5 45

Iſlands within the Straits.

Alboram		36 0N.	2 27E.
Formentaria		38 33	1 15
Ivica		38 50	1 39
Majorca		39 29	3 0
Minorca		39 51	4 0
C. Tolare, So.	End of Sardin.	38 50	9 12
C. Reperade N.		41 10	9 50
Aſinaria		41 3	8 48
Bonifacio, So.	End of Corſic.	41 24	9 46
C. Corfo, Nor.		42 56	9 50
Caprya		43 3	10 17
Liboa, or Elba		42 45	10 40
M. Chriſto		42 17	11 0
Palmoralla, or Palmeria		41 3	13 5
Ponza		41 0	13 7
Iſchia, or Eſchia		40 34	13 35
Liſſa		43 6	16 40
Agoſta		42 58	17 20
Corcola		43 3	17 32
Strombello		38 58	16 0
Vulcano		38 27	15 33
Telicur		38 35	15 0
Allicur		38 36	14 42
Uſtica		38 36	13 32
Trepano W. End of	Sicily.	37 57	13 13
Palermo		38 6	13 50
C. Paſſero E. End of		36 38	15 40
Meſſina in		38 7	16 20
Syracuſe in		37 3	15 45
Pantaloria		36 48	12 30
Limoſa		35 56	13 11
Lampidoſa		35 34	12 46
Malta		35 53	14 32
Ouvre Poel, a Rock		35 45	16 36

	Lat. D. M.	Long. D. M.
Melada	42 52N.	18 6E.
Corfu	39 42	29 46
Cephalonia	38 15	20 10
Zante	37 46	21 14
Sapienſa	36 46	21 45

Iſlands in the Archipelago.

Taſſo		40 40N.	25 17E.
Lemnos		39 59	25 37
Metyline	Cape Sygre	39 15	26 5
	P. Olivia	38 57	27 0
Siatto, or Schate		39 22	23 58
Scio, or Xio		38 22	26 12
Patmos		37 20	26 55
Tino		37 35	25 36
Zio, or Sea		37 37	24 50
Ferminia, Fermina, or Termie		37 24	24 58
Serfante, or Sifanto		36 58	25 20
Milo		36 40	25 0
W. End of Candia.	Cape St. John	35 10	24 0
E.	Cape Solom	35 0	27 8
Rhodes	N. End of Cape	36 27	28 28
	S. End Tranquil	35 52	28 28
S.W End of Cyprus	C. Baſſa	34 57	32 23
Eaſt	C. St. Andr.	35 31	35 0
Sout	C. de Gatte	34 30	33 10

Coaſt of Greenland.

	H. W. H. W.		
Nova Zem. and Iſles			
Shetland So. Point		59 56N.	1 30W
North ditto	3 0	60 50	0 10
Hangcliff	Var.		
Entr. of Brazy Sou.	23 45	60 9	0 38

Coaſt of Iceland.

Sound Royal		66 22	14 30 W
Bargazar Point		66 20	16 32
Whale's Back		65 26	20 32
Merchant's Forel		63 24	17 5
Hallitord		64 30	27 20
Fair Foreland		66 18	26 30
Grim's Iſlands		67 13	22 32
Weſtmonia Iſles		63 28	22 22
Iſles of Ferre, or Farro		62 4	5 0
Beerenburg, or Joan Main Iſle		71 33	4 30

Coaſt of Greenland.

Point Look-out	Var.	76 24	15 33E.
Horn Sound	Weſt.	76 45	13 34
Bell Sound		77 12	12 45
Charles I. Black Point		77 30	11 15

	Va. W	Lat. D. M.	Long. D M.
C. Cold N. end Charles I.	18 36	79 6N.	11 2W
Iſle Amſterdam	—	79 40	12 45
Fair Foreland	—	79 18	10 50
Hacluit's Headland	17 40	79 49	10 46
Cloven Cliff	18 24	79 43	9 56
Muſſin Iſle	18 13	80 19	11 20
Black Point	9 42	78 28	18 38
Table I. one of the 7	9 33	80 57	20 34
Smeerenburg	18 53	79 44	11 48
Dunkin's Iſle in Vogel Sound	18 47	79 42	9 59
	20 38	79 52	12 30
Hope Iſland	—	76 15	23 40
Cherry, or Bear Iſle		74 28	18 0
Admiralty Iſle		75 0	54 40
Nova Sembla		78 0	70 0
Wiegate Straits		70 30	60 0
Cape Candinoſe		69 0	42 33
Cat Noſe		65 40	35 0
Archangel		64 34	38 6
Croſs Iſland		66 30	36 30
Sweetnoſe		68 6	34 40
Kilduyn		69 24	31 20
North Cape		71 10	26 11
Surroy		71 10	20 0
Tromſound		70 20	15 26
Læfort S. W. Point		68 10	9 28
Dronthem		63 26	11 4
Statland		62 12	4 40
North Bergen		60 25	6 14
Naze of Norway		58 10	7 20

Coaſt in the Sound and Baltic.

Koll Point, a Lighthouſe		56 19N.	12 4
Mardou		58 20	8 58E
Chriſtiania		59 23	9 50
Gottenburg		57 42	12 10
Elſinure	10	56 3	11 44
Copenhagen		55 40	12 50
Kaliner		56 40	16 30
Stockholm		59 20	18 10
Wybourg		60 50	29 12
Peterſburg	0 00	59 56	30 25
Narva		59 18	28 20
Revel		59 24	25 33
Riga		57 0	25 10
Abo		60 27	22 19
Derwinda		57 12	22 0
Koningſberg		54 40	21 53
Dantzic		54 22	18 36
Wiloy in Gothland		57 50	18 25
Bornholm		55 12	14 40
Strael Sound		54 24	13 10
Lubec		54 4	11 40
Anout		56 40	12 0
Leion		57 4	11 9

Coaſt of Holland and Flanders.

	H.W.	Lat. D. M.	Long. D. M.
Scaw		57 30E.	10 54
Helighland		55 25	8 33
Bremen	6 0	53 30	9 0
Hamburgh	6 15	53 40	10 30
Embden	12 15	53 3	7 30
The Fly	6 0	43 12	5 30
The Texel	7 30	52 12	5 10
Amſterdam	3 0	52 22	5 5
Rotterdam	3 45	51 57	4 34
Antwerp	6 0	51 13	4 28
The Brill	1 30	52 0	4 1
Oſtend	12 0	51 14	3 1

The Weſtern Iſle.

Corvo		39 41N.	31 6W
Flores		39 34	31 0
Fial		38 32	28 41
Tercera		39 0	27 6
St. George's		38 45	27 55
Pico, or Pic of Azores		38 36	28 20
St. Michael's		38 12	25 42
St. Mary's		37 0	24 56

Canary Iſlands.

Porto Sancto		32 58 N	16 25W
Madeira Eaſt End		32 50	16 26
Funchal		32 30	17 5
Ditto Weſt End		32 30	17 26
Palma		28 40	17 35
Teneriff the Pic		28 13	16 25
G gamera		28 10	17 17
Fero, or Iſle of Fer		27 48	17 45
Canaria		28 13	15 38
I. Fortune Ventura ſeven others N. E. of this		28 5	13 36

Cape de Verd Iſlands.

St. Anthony		17 0N	24 25W
St. Vincent		16 45	24 25
St. Lucia		16 40	24 0
St. Nicholas		16	23 38
I. of Sel		16 45	21 52
Bonaviſta		16 5	21 45
Iſle of May		15 24	22 5
Iſle of St. Jago		15 8	22 45
Iſle of Brava		14 45	23 22
Bermudas, Middle		32 25	63 28

Iſlands in the Weſt Indies.

Trinidada		10 20 N	60 10W
Margaritta, N. P.		11 10	63 10
Tobago, N. E. Pt.		11 20	60 18
Curacoa, N. Pt.		12 21	68 35
Orcelilla		11 40	65 32

	Lat.	Long.
Aruba ———	12 25N	68 50
Bonair ———	12 15	69 5W
Blanca ———	11 40	63 58
Grenada, N. Part ——	12 20	61 19
Granadillos N. E. Point		61 11
St. Vincent, N. Part —	13 18	61 14
Barbadoes, Bridge-Town	13 9	59 54
St. Lucia ——	13 36	69 56
Port Royal, Martinico	14 36	61 9
Dominica N. Point	15 45	61 16
South Ditto ——	15 18	61 28
Marigallante, N. Part.	16 5	61 11
Guadaloupe, N. Point	16 40	61 42
Diſeado ———	16 45	61 20
Antigua, St. John's —	17 5	62 4
Mountſerrat ———	16 48	62 3
Roncador ——	16 55	62 50
Nevis ———	17 5	63 35
St. Chriſtophers's N. Pt.	17 30	63 0
St. Euſtatia, the town	17 29	63 15
Saba ———	17 39	63 15
Bird's Iſland ———	15 30	63 55
Barbuda ———	17 50	62 20
St. Bartholomew ——	17 55	63 15
St. Croix ———	17 45	64 45
St. Martin's ——	18 4	63 2
St. John's ———	18 20	64 51
St. Thomas ——	18 22	64 51
Porto Rico, N. Point	18 30	65 37
Turk's Iſle ——	21 26	70 35
Caycos, N. Pt. ——	21 45	71 45
Heneago, Weſt End —	21 10	73 26
Mayagauna ——	22 29	72 50
Virgins Gord Fort —	18 18	64 0
Crooked Iſle ——	23	74 2
Long Iſle S. End —	23 0	74 30
Ditto, N. E. Pt. ——	22 45	74 28
Atwood's Key ——	23 11	73 30
Patroſhoals E. Point	17 10	77 0
Weſt Ditto ——	17 10	79 10
Rum Key ——	23 40	74 35
Watland's Iſle ——	24 0	74 20
Salt Key ———	21 10	72 35
Doublehead Shot ——	23 54	72 34
Cat Iſle S. End ——	24 0	75 20
Andros, or Andrew, N. E.	25 10	78 20
Berry Iſle ——	26 0	78 0
Great Bahama ——	27 3	78 40
A Rock Vabala ——	15 20	75 25
New Boar ——	16 20	78 40
Serranilla ——	16 20	80 30
Ratan E. End ——	16 25	86 52
Bonaca ———	16 32	86 20
Swan Iſle ———	17 20	83 50
Miſteriofa ———	18 40	83 10
Great Cayman ——	19 30	80 45
Little Cayman ——	19 38	80 3
Altavalla ———	17 28	71 27
St. Salvadore, N. Pt.	25	75 10
Eluthera, N. Pt. —	25 10	75 20
St. Catalina ——	13 40	80 40

		Lat. D.M.	Long. D.M.
Acklin's Keys ——		22 10N.	73 35W
Miraporſos Keys ——		22 14	74 24
Iſle of Pines ——		21 21	83 35
Old Providence ——		13 35	80 40
Eaſt Point	Jamaica	17 59	76 0
Kingſtone		18 0	76 46
Portland Point		17 34	77 13
Savannah la Mar		18 2	78 39
St. Ann's Bay		18 30	77 22
Cape dono Maria	Hiſpaniola	18 40	74 30
Cape St. Nicholas		19 49	73 29
Port St. Louis		18 19	73 6
Petit Grove		18 27	73 34
Cape Francois		19 46	72 18
Fort au Prince		18 43	72 5
St. Domingo		18 22	69 55
Eaſt Point		18 34	68 14
Cape Mays	Cuba	20 17	74 18
Cape Antonia		22 3	84 55
Havannah		23 12	81 30
St. Jago		22 56	79 50

The Latitudes and Longitudes of the Coaſt of the Continent of America, from Baffen's Bay to Cape Horn.

Cape Farewell ——	59 37N.	42 40W
James's Iſland, Baffen's Bay	71 40	57 30
Cape Bay, Dudley, or Digg's Cape	76 48	59 7
Ditto Hackluit, Iſland ditto	77 25	62 0
Alderman Jones's Sound ditto ——	77 30	89 0
James Lancaſter's —— Sound ditto ——	74 10	90 0
Cumberland Iſland ——	68 0	62 30
Cape Elizabeth ——	62 35	64 0

Hudſon's Bay and Straits.

	H.W		
Cape Reſolution	7	61 30 N	65 16W
Button's Iſles —	10	60 47	65 16
Lower Savage Iſland	9	61 48	66 20
Terra Nieva	10	62 4	68 0
Saddleback Iſland	10	62 10	68 10
Great Bear Iſle	11	54 4	79 56
Ice Cove ——	10	62 0	69 0
Baker's Dozen —	11	57 0	
Great Savage Iſland	10	62 25	70 0
North Bluff —	10	62 26	71 10
God's Mercies —	10	62 28	70 48
Saliſbury Iſland	11	63 30	76 50
Nottingham. E. End	11	63 35	76 45
Cape Charles E. En	11	62 50	74 15
Ditto, Weſt End —	11	62 40	76 00
Burgea Iſles ——		47 36	57 36
Cape Walſingham	12	62 40	78 00

	H	W	Lat. D.M.	Long. D.M.
Cape Diggs	12		62 45N	78 48W
Mansfield, N. End	12		62 40	80 48
Ditto, South End	12		61 35	81 30
Sleepers Iſles			60 10	81 30
Great Sleeper			58 35	
Cape Pembroke	12		62 57	82 10
Large Swan's Neſt	12		62 20	83 30
Cape Southampton	12		62 10	86 10
Churchill River	7		58 47	94 7
Charlton Iſle			52 3	79 5
Port Nelſon, Shoals	7		57 35	92 30
Hay River	7		57 10	93 00
Cape Tatnam	8		57 30	92 00

Newfoundland.

	H	W	N	W
Bald Cape, N. E. End of Quirpon Iſle			51 39	55 32
Geeſe Cape, N. Pt. of Hare Bay			51 16	55 44
Groais Iſland, N. E.			50 0	55 44
Belliſle	12	0	50 46	55 42
Cape St. John			50 10	55 32
Iſle Fego			50 0	53 50
Cape Freels			49 30	52 54
Cape Spear			47 30	52 20
Cape Bonaviſta,			49 10	52 22
Baccaleau, Iſle at S. Entrance of Trinity Bay.			48 22	52 23
Cape St. Francis, S. Point of Conception Bay			47 53	52 30
Fort St. John, V. 24° W.	9	0	47 34	52 18
Bay Bulls			47 20	52 50
Cape Race			46 39	52 36
Virgins Rocks			46 39	51 30
Cape St. Mary's			46 50	54 0
Placentia Harbour			47 26	50 8
Chapeau Rouge			46 53	55 17
Burgea Iſland			47 36	57 31
St. Peter's Iſle			46 39	56 5
Langley Iſle			46 30	56 18
Cape Ray, V. 18			47 37	59 8
Cape Anguille, S. Point of George's Bay			47 52	59 16
Cape St. George. N. Point of St. Geo. Bay			48 28	59 8
South Head of Bay of Iſlands			49 5	58 21
Bonne Bay			49 32	57 55
Point Rich	11	¾	50 40	57 24
Point Ferole	11	15	51 2	57 5
Cape Narman			51 39	59 0

The Main Coaſt of America continued.

	H.	W.	Lat. D. M.	Long. D. M.
Belliſle in Entrance of ditto Straits	12	0	51 58N	55 26W
Cape St. Francis			52 40	55 30
Cape Charles			55 14	53 26
York, or Chateau Point			51 56	55 52
Red Bay			51 44	56 26
Iſle au Bois			51 25	57 12
Green Iſle			51 22	57 12
Grand Point			51 25	57 12
Cape Bluff			52 57	55 23
Eſquimeaux Iſland			51 23	57 40
Shecatica Bay			51 13	58 18
S. Cape, S. Michael			52 47	
Great Mecatica Iſle			50 43	59 0
Iſlands of Waſheminſker			50 5	59 52
I. Anticoſti, E. Pt.			49 23	62 8
North Weſt End of ditto	3	30	49 46	64 5
Quebec	8	45	48 47	71 12
Cape Roſier	3	30	48 58	63 45
Bonaventura			48 53	63 30
Cape Ann			48 30	63 45
Miſco Iſland, Charleur Bay			48 4	64 15
St. John's Iſle, North Cape	6	30	47 7	64 10
Fort on Ditto			46 12	63 20
Eaſt Point, Ditto			46 30	62 0
Cape St. Lowis			46 0	61 40
Cape Breton North Part W. 8.			47 6	60 8
Lewiſburg Ditto			45 54	59 50
Scatarie Iſle			46 1	61 57
Iſle St. Paul, ditto, V. 18 W.			47 12	59 56
Magdalen I. N. P.			47 30	60 30
Cape Conſo			45 18	60 48
Cape Sambro, V. 12 W.			44 31	63 25
Sambro Iſland Light Houſe			44 32	63 20
Hallifax	7	30	44 36	63 26
Cape Sable			43 24	65 30
Iſle Sable			44 8	59 50
Bay Fundy Annapolis			45 0	64 0
Boſton V. 12° 13′ W.	11	25	42 25	70 56
The Lighthouſe off ditto	10	0	42 23	70 48
Cambridge			42 25	71 10

The Main Coaſt of America continued.

	H.W.	Lat. D.M.	Long. D.M.
Cap Cod	.	42 12N	68 55W
Long Iſland	3 0	40 43	74 9
Sandy Hook	7 30	40 27	74 5
New York	9 0	40 42	74 4
Delaware Bay, Cape May	8 0	39 6	74 57
Cape James, or Hinlopin	9 0	38 56	75 6
Philadelphia	3 0	39 57	75 13
Noriton		40 10	75 17
Baltimore		39 30	75 35
Cape Charles, Aſhley River	11 15	37 11	76 7
Cape Henry	11 15	37 0	75 16
Cape Hatteras		35 24	76 20
James's River		37 0	76 40
Cape Look-out		34 55	75 0
Cape Fear	7 30	33 50	79 5
Charles Town Light Houſe	7 0	32 45	79 50
Port Royal	7 ½	32 9	79 59
Savannah River		31 54	79 39
St. John's River		30 15	82 8
Sunk Rock of ditto		30 20	81 53
Amelia Harbour	9 0	30 44	81 20
St. Auguſtine Bay	4 30	29 35	82 5
Cape Carnaveral Shoals		28 30	81 0
Leach Shoal		27 9	81 0
Cooper's Hill		26 40	81 6
Cape Florida in Gulf of Florida		25 42	81 7
Shoals off Shore		25 0 25 30	81 0
The Promontory		24 55	82 10
Chatham Bay, N. River		25 40	82 40 82 40
Cape Roman		25 35	83 5
Charlotta Harbour		26 40	83 35
Hillſborough Bay		27 50	83 57
St. Joſeph River		28 20	83 58
Amjura River		28 55	84 0
Point Pines		29 40	84 15
Fort St. Mark's		30 0	84 45
Cape St. Blas		29 30	85 35
Penſacola Bay		30 15	87 5
Mouth of River Miſſiſſipi		29 0	89 25 89 25
New Orleans		29 58	89 59
Aſcenſion Bay		29 35	90 35

Coaſt of America continued.

	H.W.	Lat. D.M.	Long. D.M.
Cabodel Norte		29 45N	92 40W
Bay d'Atacay		30 0	93 30
Iſle de St. Louis, N. E. Point		28 30	95 45
Iſle Blanca		28 30	96 30
Paſſodel Cavello		27 40	97 42
Rio Bravo		26 2	97 45
Panuco Bay		22 0	99 5
Punta Brava Veara Cruze		19 15	97 45
Mexico City		19 54	100 5
St. Martin's Point, Campeachy Bay		18 30	95 35
Fort St. Franciſco in ditto		19 40	91 25
Punta de Piedras		21 7	91 10
Cape Catouche		21 27	88 5
Gulf of Honduras		15 30	89 45
Rattan Iſland		10 25	87 5
Bonacca Iſland		10 30	86 25
Cape Honduras		16 1	86 30
Cape Cameron		15 58	85 35
St. Andrew's Iſland		12 40	81 3
Porto Bello		9 32	79 50
Gulf of Darien Trinidada Iſle		8 30	76 40
Gulf of Moreſquillo		9 15	75 54
Carthagena		10 26	75 25
Boca Grand		11 5	74 50
St. Martha		11 22	74 0
Cape de Lavela		12 7	71 45
I. Arcuba		12 45	69 52
Cape Falſo		12 10	70 35
Maracaybo		10 25	70 55
Cape de San Roman		11 30	69 20
Cape Codera		10 50	65 30
Blanche		12 15	64 15
Cape Three Points		10 46	67 45
Porto Cabello		10 30	67 32
Point de la Galara I. Trinidada		10 30	59 55
Mouth of River Oronoco		8 35	58 40
Surinam		6 0	55 50
Cayenne		4 56	52 10
Cape Orange		4 10	51 40
North Cape		1 45	49 0
North of the River Amazons		0 30	47 35

South America.

	H.W.	Lat. D.M.	Long. D.M.
Iſland St. Juan		1 20S.	45 0W
Mouth of River Omara		5 0	34 55
I Ferdinando Loronho		3 48	30 50
Cape Roque		5 0	35 45
Cape St. Auguſtine		8 50	35 10
River St. Franciſco		10 55	36 40
Bay of Tados Sanctos		13 5	39 0
Port Segura		17 0	40 0
Spirito Sancto		20 20	40 0
Rio Janciro		22 51	42 40
Cape Frio		23 0	40 20
St. Catherine's		27 46	48 0
River Grand		32 0	50 40
Cape Mary		35 0	55 22
Buenos Ayres		34 35	58 31
River Plate		36 0	57 40
Cape Matas		45 0	64 20
Cape Blanco, near River Camaroons		47 0	64 0
Port Deſire, to mak it with Steepl Rock on the ſide o it		47 20	64 40
Pepy's Iſle, could no be found by Com. Byron		47 20	66 40
River Julian		49 10	68 44
Cape Virgin Mary		52 21	67 54
York Minſter		55 26	70 8
Straits of Magellan Entrance		52 50	72 35
Staten Iſland		54 30	69 0
Evout's Iſland		55 34	66 39
Straits le Maire is between Staten I. and Terra del Feugo			
Falkland Iſland		51 30	60 0
Terra del Fuego, or the Land of Fire, South Point of C. Horn		55 50	67 26
Barnevelt's Iſland		55 50	66 58
Ildefonſo's Iſles		55 51	69 21
Cape Noir was made by C. Anſon, when he expected to be 7° 30′ W. from it.		54 30	73 43
C. Diſeada and the Twelve Apoſtles		55 4	74 20
W. Entrance of Magellan Straits		53 0 S.	79 0 W
The Four Evangeliſt off Cape Victory		52 20	80 30
Cape St. Catalina		51 33	80 20
Com. Anſon's Watering Harbour		46 0	77 45

Coaſt of Chili.

		Lat. D.M.	Long. D.M.
I. Mocha		38 30S.	78 6W
Conception		36 43	72 40
Valparyſo		33 3	72 19
Juan Fernandes I.		33 30	84 8
Coquimbo		30 0	71 16
Ambroſe Iſle		26 0	84 7
I. Salada in Salt Bay		26 30	74 30

Coaſt of Peru.

		Lat. D.M.	Long. D.M.
Gouana I.		21 0S.	75 20W
Ylo		17 36	71 13
Arica		18 26	71 11
C. Congallan		14 15	79 0
Lima City		12 1	76 45
C. Blanco		4 0	81 5
Guioquil		2 11	81 4
C. St. Helena		2 20	81 20
C. Lorenzo		1 2	80 17
Quito		0 13	77 55
C. St. Francis		0 45	81 0
Bona Ventura Bay		3 30	77 0
C. Corientes, Coaſt Papayan		4 20	78 20
Panama		8 45	80 30
Point Mala Co. of Paragua		7 0	81 0
C. St. Catherine		11 0	88 30
C. Remedie		12 50	93 0
Acapulca		17 10	104 30
C. Corientes, Co. Guatimala		19 45	110 0
St. Thomas's Iſle		20 10	113 0

Coaſt of California.

	Lat. D.M.	Long. D.M.
C. Conception	36 0N	126 0W
C. Mendocin, diſcovered by Sir F. Drake, in the year 1578, New Albion	42 20	130 0
Mouth of the River of the Weſt, diſcovered in 1603, by M. d'Aquilar, ſaid to join Nelſon R. Hudſon's Bay	44 30	131 0W
Coaſt diſcovered by Captain Iſchirckow, in 1741, and B. C. Bering in 1741 from	55 0 to 60 0	137 0 to 140 0E.
C. Selias	59 10	146 30W
C. St. Hermogenies	58 45	154 20

	Lat. D. M.	Long. D.M.
I. St. Stephen, at the Mouth of the Sea of Kamſchatka	50 45N	180 25W
Bering's Iſle, where he was caſt away and died, ſaid to be 5° Weſt from the Coaſt of America	55 35	190 0 to 170 0E.

Sea of Anadir.

	Lat. D. M.	Long. D.M.
Iſle of St. Lawrence	64 0N	173 30 W
The Neck of the Sea between Aſia and America from Coaſt to Coaſt, 4,20 or 35 Leagues, 105 Miles.	66 0	170 0
Sedition Iſ.	50 40	166 0
South Point of Kamſchatka	51 3	157 0
Nurelian Iſles between 45° N. and 152 E.	54 0	157 0

Southern Iſlands in the Atlantic.

	Lat. D. M.	Long. D.M.
St. Matthew's	1 23S.	6 10W
Aſcenſion	7 57	13 54
St. Helena	16 4	5 54
Fernandepo	3 2N	3 32 E
Princes	1 48	6 40
St. Thomas	0 0	7 0
Cape Podron	6 0S	11 40
Annabona	2 26N	5 40
St. Philip's	12 22S	13 20
Triſtian de Cunda	37 10	13 20W
Iſle de Picos	24 0	16 20
I. Martinwas	21 0	18 40
I. St. Maria	20 0	18 40
Iſle Trinidada	20 30	25 30
I. Aſcenſion	20 40	28 30
I. Fanando Noranha	3 50	30 35
I. Rocas	5 0	35 40
I. Sabaldes	50 53	50 35
Whitſunday Iſland	19 26	137 56
Queen Charlotte's Iſland	19 18	138 4
Egmount Iſland	19 20	138 30
Duke of Gloucefter's Iſland	19 11	140 6
Duke of Cumberland's Iſland	19 18	140 34
Prince William Henry's Iſland	19 0	141 6
Oſnaburgh Iſland	17 51	147 30
King George III's I. or Otaheite S.E. end	17 48	149 15
King George III's I. or Otaheite NW end	17 30	150 0
Duke of York's Iſland	17 28	150 16
Sir Charles Saunders's Iſland	17 28	151 4
Lord Howe's Iſland	16 46	154 13
Scilly Iſland	16 28	175 30
Boſcawen's Iſland	15 50	175 10

	Lat. D.M.	Long. D.M.
Auguſtus Keppel's Iſland	15 53S.	175 13W
Wallis's Iſland	13 18	177 0
Adventure Bay, N. Holland	43 23	147 0E
Adventure I. S. Sea	17 5	144 18W
Ambrym I. ditto	16 9	168 12E
Amſterdam I. ditto	21 9	174 46W
Annamocka ditto	20 16	174 30W
Apac I. ditto	16 46	168 27E
Aurora I. ditto	15 8	168 17E
Bolſchereſkoi, Siberia	52 54N	156 37E
Briſtol Cape, Sandwich-Land	59 2S	26 51W
Buller Cape, South Georgia	53 58	37 40
Candlemas I. Saudwich Land	57 10	27 13W
Charlotte Cape, S. Georgia	54 32	36 11W
Cape Coronation, N. Caledonia	22 5 S	167 8E
Commin I. S. Sea	31 40N	8 4E
Gunief, Siberia	47 7	51 57E
Hinchinbroke I. S. Sea	17 25S	168 30E
Hood's I. ditto	9 26	138 52W
Jakutſkoi, Siberia	62 1N	129 47E
I. of Pines. S. Sea	22 38S	167 38E
Port Madre de Dios Aſia, ditto	9 55	139 8W
Magdalena, I.	10 25	138 49W
Maſkelyne I. ditto	16 32	167 59E
Montago I. ditto	17 26	168 31E
Norfolk I. ditto	29 2N	168 10E
Obevahoa I.	9 40S	139 1W
Ohitahoo I.	9 55	139 6W
Onatiayo I.	9 58	138 51W
Oſnaburgh I.	17 52	148 6W
Huahini I.	16 44	151 8W
Palliſer's I. ditto	15 38	146 30W
Palmerſton's I. ditto	18 0	162 57W
Paoom I. ditto	16 30	168 28E
Portland I. ditto	39 25	178 12E
Pyleſtaart's I. ditto	22 23	175 41W
New Hebrides, ditto	14 56	167 20E
Sandwich I. ditto	17 40	168 33E
Shepherd's I. ditto	16 58	168 42E
Toankaa I. ditto	14 30	145 9W
Tobolſki, Siberia	58 12N	68 13E
Tonga Tabu I. S. Sea	21 9S	174 49W

Coaſt of Siberia.

	Lat. D.M.	Long. D.M.
Cape Chiokotſkago	64 0 N	174 45W
Cape Chuckehenſo	66 30	171 10
Holy Cape	72 32	179 45E
Hamchatka Lower	56 11	159 25
Hamchatka Upper	54 48	157 25
I. Karaghenſkoy	58 0	162 10
Cape St. Thadaus	62 10	175 5

Many of theſe Parts were but little known to Europeans until 1736, when Captain Bering, a Ruſſian, diſcovered Part of the Coaſt of Siberia; nor is it yet determined whether there be any Northern Communication between the Eaſtern and Weſtern Oceans.

The Coaſt of Barbary and Guinea

	Lat. D.M.	Long. D.M.
Cape Spartel	35 44N.	5 36W
Laracne	35 4	6 2
Sallee	34 2	6 13
Cape Blanc	33 10	8 10
Cape Cantin	32 47	8 48
Saphie	32 28	8 43
Cape de Gee	30 45	10 8
Cape Croix	30 38	9 50
Cape Nun	28 47	11 5
Cape Bojadore	26 30	14 21
Cape das Barbas	22 5	17 10
Cape Blanco	20 47	17 11
Senegal	15 50	17 55
Cape de Verd	14 42	17 8
River Gambia Entrance	13 28	16 5
Cape Rouge	12 15	16 20
R. de Sierra Leona Entr.	8 22	12 8
Cape Mount	6 38	9 34
Cape Mezurado	6 12	9 3
River Seſtos Entrance	5 30	7 42
Cape Palmas	4 28	5 58
R. St. Andrew Entrance	5 8	4 26
Cape la Ho	5 2	3 16
Cape three Points	4 42	1 5
River Volta	5 48	1 42 E
Road of Juda in the Gulph I. of Benin	6 10	2 58
Road of Little Ardra in the Gulph of Benin	6 16	3 16
R. Formoſa, or Benim En.	6 38	4 52
Benin Town	7 42	5 28
Cape Formoſa	4 32	6 31
New Calabar River Entr.	4 30	6 48
Old Calabar River Entr.	4 32	7 46
R. Cameron Entrance	4 0	9 10
Iſle Fernando Point	3 8	8 52
Prince's Iſle	1 30	7 52
St. Thomas's Iſle	0 12	7 10
Cape St. John	1 11	9 13
River Gabon Entrance on the Equator	0 0	9 10
Cape Lopas Gonſalvo	0 50S	8 41
Iſle Annabona	1 26	6 18
Cape St. Catherine	2 9	9 3
Majumba, or Alva Entrance of Bay	3 15	9 30
Cape Padron	5 55	11 5
The Town of Congo	6 6	11 30
Cape Ledo	9 30	11 20
Benguela	12 8	10 45
Cape Negro	16 2	9 28
Bay of Conception, or Gulph of St. Thomas Entrance	24 42	13 33
Cape Voltas	28 55	15 33
Bay St. Helena, or St. Martin	31 42	17 33

The Coaſt of the Main Continent in the Eaſt Indies.

	Lat. D.M.	Long. D.M.
Cape of Good Hope	34 29S.	18 23 E
Cape Hanglip	34 16	19 0
Fa's Bay	34 12	18 45
Cape Falſe	34 34	19 10
Cape Laquillas	34 44	20 32
Cape Baſſas, or Baxas	34 26	22 30
Logoa Bay	33 25	25 45
River St. Chriſtopher's	32 47	27 38
Point Natal	31 50	27 38
St. John's River	31 45	33 15
Bay of Natal	29 25	33 10
River St. Lucia	28 20	30 50
C. Fumos	27 27	31 5
Algoa Bay, St. Mary's	25 48	31 10
River Manica	23 31	32 2
C. Corientes	24 0	34 50
C. St. Sebaſtian, Var. 25° W.	22 41	34 30
I. Bazarutto	21 55	34 35
Sofala	20 29	33 30
River Cuama	18 14	36 10
Angoſha, or Angoxa	16 30	38 40
Moſambique	15 18	40 53
St. Lazarus Bank	12 8	41 20
C. Delgada	10 10	41 12
Quiloa	8 40	39 58
Monſia Iſlands	7 36	40 45
Zenzibar Iſlands	6 55	40 10
Pemba Iſlands	4 32	40 45
Mombas	3 50	41 28
Melinda	2 53	42 15
B. Formoſa	2 30	42 30
R. Rouges	2 2	44 30
R. Magadoxa	1 57	47 27
C. Das Baſſas	4 50	49 43
C. Orfui	10 25	52 10
C. Guardafoy	11 45	52 17
Aden	13 2	46 28
Straits of Babelmandel Entrance of the Red Sea	12 45	43 50
Mocho	13 19	44 15
C. Azab	12 42	42 28
I. Sabagar	15 0	42 33
C. Rat	11 45	41 2
Iſlands Dahlac	15 30	39 50
Suaken	19 33	36 10
Judda	12 36	38 50
Macca	20 35	40 0
C. Noſe	23 50	35 10
C. Caofir	25 20	34 5
Mount Sinai	29 30	33 20
Suez	30 2	32 21
C. Fartaſh, or Fortauch N. E. Entrance of the Red Sea.	15 30	52 30

	Lat. D. M.	Long. D. M.
Cape Morbat	16 45 N	55 30 E
Cape Raſalgate	22 16	60 5
Cape Marha	18 30	58 0
Maſkate	23 30	38 13
Cape Mozandum, or Muſeldom, Perſian Gulph Entrance	26 17	56 25
G. Ormus	27 5	56 30
Gombaroon	27 15	56 12
I. Kiſhme	26 29	55 45
Congo	26 45	55 25
Is. Cayen	26 30	54 0
Is. Samake	26 16	49 10
Is. Baharen	26 40	48 50
Kadhema	28 16	48 0
Baſſora, or Baſra	30 30	48 3
Cape Bardiſtan	28 0	52 5
Mouth R. Euphrates	30 49	48 30
Agra	26 43	76 49
Cape Nabon	27 36	51 58
Cape Jaſques	25 36	57 20
Cape Goadel	24 25	64 5
Cape Mohanzo	24 25	67 15
Kaſha	23 55	71 2
M. Indus R. Tatta	24 50	68 26
Giant's Point	22 10	68 24
Dui Point	20 40	69 45
G. Gambaya	22 20	71 27
Surat	21 10	72 25
Daman	20 20	72 6
Cape St. John	20 0	71 30
Bacain	19 32	72 0
Bombay	19 0	72 5
Rajapore	17 4	72 45
Caimſer's Bank	16 25	71 45
Coral Bank	16 0	71 45
Elizabeth Bank	16 59	71 5
Burnt Iſlands	15 50	73 35
Goa	15 31	73 45
Cape Rama	15 10	73 40
Carwave	14 55	73 54
Tellicherry	11 50	75 8
Mount Dilly	12 5	75 0
Callicut	11 21	75 33
Cochin	10 0	75 52
Cape Comorin	7 55	77 20
Manapar	8 30	78 12
Cape Calminera	10 15	79 45
Negapatnam	10 35	80 3
Pagodas	11 16	80 5
Trankbor	10 54	80 3
Fort St. David's	11 57	80 5
Pondicherry	11 56	79 25
Madraſs	13 18	80 2
Paliacate	13 30	79 55
Dui Head	16 10	81 45
Maſulipatanam	17 36	83 28
Chicakol	18 30	84 7
Ganjam	19 18	85 32
Balaſore	21 20	87 28
P. Palmiras Mouth of Ganges	20 50	87 30

	Lat. D. M.	Long. D. M.
Chandernagore	22 53 N	88 34 e
Iſlamabad	22 20	91 50
Hugley	23 56	88 34
Calcutta	22 34	88 35
St. Martin's Is.	20 0	91 45
Aracan R.	19 57	92 25
Chedula Is.	18 35	92 30
P. Negrais	16 9	92 30
Tavay River	13 30	96 45
Martaban Gulf	16 15	96 10
Marghi	11 59	97 15
Junkſelon	8 0	97 0
Pulo Pinang	5 30	98 45
Straits of Malacca	2 12	95 5
Malacca	2 15	102 5
Point Romania	1 17	104 26
G. of Siem	9 30	102 0
Cape Patina	7 1	100 30
Cham	12 45	100 30
Siam, or Judia	14 35	100 3
C. Liam	12 30	100 1
Manſapa	12 20	101 30
Ponthimas	10 4	105 30
Cambodia Point	8 55	105 39
R. Cambodia's Mouth	19 30 10 0	107 15 107 40
Cape St. James	10 32	108 7
Comorin Bay	11 50	110 10
Waſſen's Bay	12 15	110 15
Cape Avarella	13 1	110 10
Banbom	14 55	108 30
Cape Touron	16 40	108 45
Paſſien B.	26 35	107 47
R. Tonquin	20 47	107 0
Suiven Point	20 10	110 45
Canton	23 7	113 8
Ningpo	29 58	120 23
Hoai Neghan	33 35	118 56
Nankin	33 30	120 0
Singhangfu	34 16	108 50
Pekin	39 55	116 36
Straits of Bali, S. Entra.	8 39	114 30
—— N. Entra.	7 54	
Straits of Banca, W Ent.	2 0	102 45
——, E. Ent.	3 0	103 43
Straits of Sunda, S. Entra	5 58	103 5
Straits of Malacca, N. W. Entrance	6 15 N	94 45
Straits of Sincapore, or S. E. Entrance of the Malacca Straits	1 10	104 17
Straits of Sapi	8 34 S	119 45
Straits of Manilla	13 45 N	120 30
Parcellar Hill, Strait of Malacca, Var. 1 30 W.	3 15	101 2

The Tide flows N. N. E. and S. S. W. and the Flood runs E. S. E. and ebbs W. N. W.

Iſlands in the Eaſt Indies.

		Lat. D.	M.	Long. D.	M.
Dutch Bank		38	0S.	33	40E
Amſterdam		38	30	74	0
St. Paul		37	52	77	55
New Holland S. Point		37	15	147	30
Leuwin's Land ditto		35	0	130	0
Cape York ditto		11	15	141	0
Sandy Cape Weſt Point		25	30	171	0
George's Cape		35	15	151	0
Tryal's Rocks off ditto		19	0	105	2
Cape St. Mary	Iſle Madagaſcar	25	34	44	12
Star Bank		25	0	43	10
B. S. Auguſtine V. 24 W.		23	35	43	10
Cape St. Vincent, V. 22 26 W		21	30	43	03
Cape St. Andrews V. 21 50 W.		16	35	44	20
Cape St. Sebaſtian		12	45	48	29
Cape de Ambra, or Natal		12	15	49	15
B. de Antongill		16	0	49	08
Antavares		21	5	47	04
Matatanes		22	15	46	45
Cape Ramos		25	0	46	9
Baſſos d'India		22	30	40	46
Querimbo		12	22	40	50
A Rock		21	35	39	15
A Rock in		21	28	41	30
St. Chriſtopher's		17	19	42	18
Engliſh Bank		17	56	39	3
Iſle of Fire		17	20	32	15
St. Juan de Nova		17	5	41	20
Mayotta		13	0	45	30
Mohilla		12	20	43	50
Baſſas de Chagas		6	40	72	50
Joanna		12	18	44	50
Cocos Iſland		12	30	96	0
Comora		11	30	43	53
Glorioſa		12	4	47	30
Apalioria		9	59	80	0
Bank of Patrom		5	3	62	45
De Gama		2	20	74	15
Juan de Nova		9	58	51	0
Padro de Banhas		5	39	50	45
St. Franciſco		6	21	53	0
Iſle Amarantes		5	27	48	45
Seven Brothers		3	25	60	30
Sea Cows		3	36	50	46
Three Brothers		3	45	62	30
Maſcarenhas		2	55	56	55
I. Seychelles H. W. 5 30		4	37	55	38
Carpo Santo		6	30	56	44
Diego Rais		0	45	70	25
Padro Banhos		6	50	70	25
Little Comoro		10	10	44	15

		Lat. D.	M.	Long. D.	M.
Diego Garſcia		7	42 N	75	30
Caudu		5	55	73	30
St. Brandon		16	38	62	55
Rodrique		19	41	65	17
Bourbon, St. Dennis		20	52	55	35
Mauritus		20	10	57	22
Cocos Iſland		12	20	96	5
Chriſtmas Iſle		10	45	104	30
Naſſaw		3	0	100	25
Iſle Good Fortune		1	30	90	30
Minta		0	26	98	5
Engona		5	15	102	45
N. Part	Sumatra	6	0 N	94	35
Acham, or Acheen		5	20	95	35
Point Baſſe		5	27	94	45
Diamond Point		5	17	97	5
Bencoolen		3	55 S	103	4
South Point		6	2	104	16
R. Palambam		3	2	104	45
Banca S. End		3	15	107	10
N. Weſt End		1	50	105	30
Prince's Iſles Straits of Sundy		5	30	103	30
Middle Iſle ditto		5	57	104	40
Java Head	Java	6	45	105	20
Bantam Ditto		6	0	105	49
Batavia		6	12	106	43
Cape Sandana		7	42	114	30
E. Point		8	42	114	37
Lombok		8	30	116	30
Cumbava		9	28	118	20
Rotto		11	25	123	45
Timor N. End		9	0	128	0
Weſt Point		10	30	122	55
Timorland, N. Point		9	0	123	12
New Guinea					
Cape Deliverance ditto		11	30	157	55
Cape of Good Hope ditto					
Weſt Point ditto		1	32	131	40
New Britain, N. Point		1	30	148	10
South Point		6	55	149	0
Ceram Eaſt Point		3	56	131	15
W. Point		3	36	127	46
Boero, or Burro		3	30	126	20
Providence Is.		0	20	135	0
Gilola S. Point		0	20	145	0
N. Point	Celebes	1	15 N	145	0
N. E. Point		1	15	124	37
N. W. Point		1	40	120	50
W. Point		4	5 S	117	55
S. W. Point		4	40	119	5
S. Point		5	56	119	55
S. E. Point		5	0	121	40
Macaſſar		5	10	119	7
E. Point	Borneo	1	2 N	118	30
W. Point		0	0	108	57
N. Point		7	5	117	20
S. Point		4	15 S	114	30
Balambangan		7	19	117	12
Socrata E. Point		11	59 N	55	7
W. Point		12	25	54	12

		Lat. D. M.	Long. D. M.			Lat. D. M.	Long. D. M.
I. Halabi - -		16 50 N	56 52e	Mindora S. Point -		12 0 N	121 30e
Abdeleur - -		11 55	53 45	N. W. Point - -		13 30	119 15
Lakedivas Is. N. Point		13 33	70 3	Panay S. Point -		10 33	122 4
S. Part — —		10 3	71 30	N. Point - -		11 42	120 0
			74 30	N. Point -	Luconia	13 45	120 20
Maldevas Limits		8 30	74 0	Manilla Bay -		14 30	120 20
		1 30	76 30	N. Point -		19 0	121 25
Point de Gale		6 15	80 20	C. Baxeadore ditto		18 44	120 40
Infanapatnum	Ceylon	9 47	80 55	Diamond Iſle - -		15 42	93 15
N. Part		9 45	80 20	South Point	Formoſa	21 45	121 36
Trincomalay		8 32	81 40	N. Point		25 15	121 45
E. End		7 30	82 15	N. E. Point		25 15	122 15
W. End		6 15	80 20	Man-han		23 30	121 15
I. Cocos - -		14 30	92 10	Hainan S. Point		18 22	109 30
Great Andaman —		14 0	92 0	N. E. Point		19 55	111 10
		11 45		Van Cheau - -		18 50	110 45
Little Andaman —		10 30	92 3	Parracles Is. S. Part		11 45	110 45
Cor. Nicobar - -		9 12	92 32	N. Part - -		16 30	111 45
Nicovari - -		8 3	93 45	Macao - -		22 14	113 50
Nicobar - -		7 22	92 45	Leykeyo N. Part - -		28 0	128 10
Puloway - -		5 55	95 2	S. Part - -		25 30	128 30
Pulo Paſſang - -		5 52	104 30	Cummin - -		31 40	121 4
Pulo Timon - -		2 45	104 14	Homdo S. Point	Japan	32 20	129 54
Pulo Aroe - -		2 28	105 0	Nanagacqui		32 32	130 2
Anamba - -		2 58	106 45	Dos Cavalhos		32 32	129 53
Natuna - -		4 0	108 38	N. Part Cape Sugar		40 20	140 25
Pulo Condor - -		8 40	107 55	Cape Nebo		39 15	142 5
Banguay - - -		7 12	117 35	Peſcadores Is. S. End		11 0	167 30
Pulo Sapata - -		9 54	109 57	N. Part - -		11 20	167 0
Paragua S. Point -		8 12	117 50	The Triangles N. Part		17 5	112 4
I. Negros, S. Point -		9 15	120 20	Woody I. - -		1 46	106 10
——— N. Point -		11 20		The Elephant and Camel		9 2	113 3
N. Point		9 40	126 45	Andradas Rock -		9 51	110 50
Panguel Bay	Mindanas	7 55	124 30	Victory I. - -		1 43	106 48
S. E. Point		6 40	127 30	Pulo Runda - -		6 0	95 30
Mindanas			123 0	Foul Iſland -		18 6	92 23
S. W. Point		6 45	122 2	Macclesfield Shoal -		15 0	114 20
Cape Auguſtine		6 30	126 0	Pulo Pera - -		6 10	97 46
S. Point		5 45	122 45	Three Brothers -		10 32	108 4

The Latitude and Longitudes of ſundry Places, collected from Captain COOK's laſt Voyage.

N. Zealand N. Cape	New Zealand	34 10	173 15	St. Preobraſcnuia Is.	58 20 N	175 10
——— S. Cape		47 30 S	167 60	St. Mathew's I. -	60 40 N	177 30 E
——— E. Cape		37 10 S	179 15	St. Andrean I.	61 35 N	170 0W
Cook's Straits ditto		41 30 S	175	St. Samuel I. - -	62 20 N	173 0W
Harvey's Iſland - -		19 18 S	158 54W	St. Lawrence I.	62 30 N	178 30W
Ulilia - -		16 45 S	151 25W	St. Diomedis - -	63 0 N	170 0W
Hue-heini - -		16 41 S	151 3W	St. Titi I. - -	63 30 N	172 0W
Turtle Iſland - -		2 2 N	152 0W	Tuſki Noſs Straits between Aſia and America	65 0 N	171 0W
Owhy-hie, where Capt Cook was killed -		22 N	169 10W	Alaſhka Iſlands	54 30 N	179 0 E
Sandwich Iſland -		21 44 N	161 0W		55 40 N	178 30W
St. Nicholas I. - -		63 45 N	173 0W	Hinchinbroke Sound	58 30 N	152 30W
Palmerſton I. - -		18 5 S	163 30W	Shumagin's Is. - -	57 42 N	149 0W
Friendly I. - -		18 47 S	174 30W	Sandwich Sound, Cape St. Alias - -	59 20 N	145 0W
Cook's Harbour -		49 N	124 30W	Iſlands San-Carlos -	54 40 N	139 30W
Port Bucarelly - -		55 N	120 30 E	A Harbour where Capt. Cook repaired	49 0 N	126 0W
Port St. Peter and St. Paul		53 27 N	158 30 E			
Kamtchatka - -		56 45 N	160 7 E			
Beering's Is. - -		54 57 N	164 49 E			
River Andyr - -		64 30 N	172 0 E			
Alcutian Iſlands —		53 0 N	166 0 E			

Note. Captain Cook's laſt Voyage has fully determined the Impracticability of ſailing to the Eaſt Indies by the North of Europe, and that the Continents of Aſia and America are ſeparated by a narrow Channel.

A Table of Meridional Parts.

M.	0d.	1d.	2d.	3d.	4d.	5d.	6d.	7d.	8d.	9d.	10d	11d	11d	[illegible]	M.
0	0	60	120	180	240	300	361	421	482	542	603	664	725	787	0
1	1	61	121	181	241	301	362	422	483	543	604	665	726	788	1
2	2	62	122	182	242	302	363	423	484	544	605	666	727	789	2
3	3	63	123	183	243	303	364	424	485	545	606	667	728	790	3
4	4	64	124	184	244	304	365	425	486	546	607	668	729	791	4
5	5	65	125	18[illegible]	245	305	366	426	487	547	608	669	730	792	5
6	6	66	126	186	246	306	367	427	488	548	609	670	731	793	6
7	7	67	127	187	247	307	368	428	489	549	610	671	732	794	7
8	8	68	128	188	248	308	369	429	490	550	611	672	733	795	8
9	9	69	129	189	249	309	370	430	491	551	612	673	735	796	9
10	10	70	130	190	250	310	371	431	492	552	613	674	736	797	10
11	11	71	131	191	251	311	372	432	493	553	614	675	737	798	11
12	12	72	132	192	252	312	373	433	494	554	615	676	738	799	12
13	13	73	133	193	253	313	374	434	495	555	616	677	739	800	13
14	14	74	134	194	254	314	375	435	496	556	617	678	740	801	14
15	15	75	135	195	155	315	376	436	497	557	618	679	741	802	15
16	16	76	136	196	256	316	377	407	498	538	619	680	742	803	16
17	17	77	137	197	257	317	378	438	499	559	620	681	743	804	17
18	18	78	138	198	258	318	379	439	500	560	621	682	744	805	18
19	19	79	139	199	259	319	380	440	501	561	622	683	745	806	19
20	20	80	140	200	260	320	381	441	502	562	623	684	746	807	20
21	21	81	141	201	261	321	382	442	503	563	624	685	747	808	21
22	22	82	142	202	262	322	383	443	504	564	625	686	748	809	22
23	23	83	143	203	263	323	384	444	505	566	626	688	749	810	23
24	24	84	144	204	264	324	385	445	506	567	627	689	750	811	24
25	25	85	145	205	265	325	386	446	507	568	628	690	751	812	25
26	26	86	146	206	266	326	387	447	508	569	629	691	752	813	26
27	27	87	147	207	267	327	388	448	509	570	630	692	753	814	27
28	28	88	148	208	268	328	389	449	510	571	632	693	754	816	28
29	29	89	149	209	269	329	390	450	511	572	633	694	755	817	29
30	30	90	150	210	270	330	391	451	512	573	634	695	756	818	30
31	31	91	151	211	271	332	392	752	513	574	635	696	757	819	31
32	32	92	152	212	272	333	393	353	514	575	636	697	758	820	32
33	33	93	153	213	273	334	394	454	515	576	637	698	759	821	33
34	34	94	154	214	274	335	395	455	516	577	638	699	760	822	34
35	35	95	155	215	275	336	396	456	517	578	639	700	761	823	35
36	36	96	156	216	276	337	397	457	518	579	640	701	762	824	36
37	37	97	157	217	277	338	398	458	519	580	641	702	763	825	37
38	38	98	258	218	278	339	399	459	520	581	642	703	764	826	38
39	39	99	159	219	279	340	400	460	521	582	643	704	765	827	39
40	40	100	160	220	280	341	401	461	522	583	644	705	766	828	40
41	41	101	161	221	281	342	402	462	523	584	645	706	767	829	41
42	42	102	162	222	282	343	403	463	524	585	646	707	768	830	42
43	43	103	163	223	283	344	404	464	525	586	647	708	769	831	43
44	44	104	164	224	284	345	405	465	526	587	648	709	770	832	44
45	45	105	165	225	285	346	406	466	527	588	649	710	771	833	45
46	46	106	166	226	286	347	407	467	528	589	650	711	772	834	46
47	47	107	167	227	287	348	408	668	529	590	651	712	773	835	47
48	48	108	168	228	288	349	409	469	530	591	652	713	774	836	48
49	49	109	169	229	289	350	410	470	531	592	653	714	775	837	49
50	50	110	170	230	290	351	411	471	532	593	654	715	776	838	50
51	51	111	171	231	291	352	412	472	533	594	655	716	777	839	51
52	52	112	172	232	292	353	413	473	534	595	656	717	779	840	52
53	53	113	173	233	293	354	414	474	535	596	657	718	780	841	53
54	54	114	174	234	294	355	415	475	536	597	658	719	781	842	54
55	55	115	175	235	295	356	416	477	537	598	659	720	782	843	55
56	56	116	176	236	296	357	417	478	538	599	660	721	783	844	56
57	57	117	177	237	297	358	418	479	539	600	661	722	784	845	57
58	58	118	178	238	298	359	419	480	540	601	662	723	785	846	58
59	59	119	179	239	299	360	420	481	541	602	663	724	786	347	59

A Table of Meridional Parts.

M	14d	15d	16d.	17d.	18d.	19d.	20d.	21d.	22d.	23d.	24d.	25d.	26d.	27d.	M
0	848	910	973	1035	1098	1161	1225	1289	1354	1419	1484	1550	1616	1684	0
1	849	911	974	36	99	63	26	90	55	20	85	51	18	85	1
2	851	913	975	37	1100	64	27	91	56	21	86	52	19	86	2
3	852	914	976	38	01	65	28	92	57	22	87	53	20	87	3
4	853	915	977	39	02	66	29	93	58	23	88	54	21	88	4
5	854	916	978	41	03	67	30	94	59	24	90	56	22	89	5
6	855	917	979	42	05	68	32	96	60	25	91	57	23	90	6
7	856	918	980	43	06	69	33	97	61	26	92	58	24	91	7
8	857	919	981	44	07	70	34	98	62	27	93	59	25	93	8
9	858	920	982	45	08	71	35	99	63	28	94	60	26	94	9
10	859	921	983	1046	1109	1172	1236	1300	1364	1429	1495	1561	1628	1695	10
11	860	922	984	47	10	73	37	01	66	31	96	62	29	96	11
12	861	923	985	48	11	75	38	02	67	32	97	63	30	97	12
13	862	924	986	49	12	76	39	03	68	33	98	64	31	98	13
14	863	925	987	50	13	77	40	04	69	34	99	65	32	99	14
15	864	926	988	51	14	78	41	05	70	35	1500	67	33	1700	15
16	865	927	989	52	15	79	42	06	71	36	02	68	34	01	16
17	866	928	990	53	16	80	43	07	72	37	03	69	35	03	17
18	867	929	991	54	17	81	44	08	73	38	04	70	37	04	18
19	868	930	992	55	18	82	45	10	74	39	05	71	38	05	19
20	869	931	994	1056	1119	1183	1247	1311	1375	1440	1506	1572	1639	1706	20
21	870	932	995	57	20	84	48	12	76	41	07	73	40	07	21
22	871	933	996	58	21	85	49	13	77	43	08	74	41	08	22
23	872	934	997	59	22	86	50	14	79	44	09	75	42	09	23
24	873	935	998	60	23	87	51	15	80	45	10	77	43	10	24
25	874	936	999	61	25	88	52	16	81	46	11	78	44	12	25
26	875	937	1000	63	26	89	53	17	82	47	13	79	45	13	26
27	876	938	1001	64	27	90	54	18	83	48	14	80	47	14	27
28	877	939	1002	65	28	91	55	19	84	49	15	81	48	15	28
29	878	941	1003	66	29	92	56	20	85	50	16	82	49	16	29
30	879	942	1004	1067	1130	1193	1257	1321	1386	1451	1517	1583	1650	1717	30
31	880	943	05	68	31	94	58	22	87	52	18	84	51	18	31
32	881	944	06	69	32	95	59	24	88	53	19	85	52	20	32
33	883	945	07	70	33	96	60	25	89	55	20	86	53	21	33
34	884	946	08	71	34	97	61	26	90	56	21	88	54	22	34
35	885	947	09	72	35	99	62	27	92	57	22	89	56	23	35
36	886	948	10	73	36	1200	64	28	93	58	24	90	57	24	30
37	887	949	11	74	37	01	65	29	94	59	25	91	58	25	37
38	888	950	12	75	38	02	66	30	95	60	26	92	59	26	38
39	889	951	13	76	39	03	67	31	96	61	27	93	60	27	39
40	890	952	1014	1077	1140	1204	1268	1332	1397	1462	1528	1594	1661	1729	40
41	891	953	15	78	41	05	69	33	98	63	29	95	62	30	41
42	892	954	16	79	42	06	70	34	99	64	30	96	63	31	42
43	893	955	18	80	44	07	71	35	1400	65	31	98	64	32	43
44	894	956	19	81	45	08	72	36	01	67	32	99	66	33	44
45	895	957	20	82	46	09	73	38	02	68	33	1600	67	34	45
46	896	958	21	83	47	10	74	39	03	69	35	01	68	35	46
47	897	959	22	85	48	11	75	40	05	70	36	02	69	36	47
48	898	960	23	86	49	12	76	41	06	71	37	03	70	38	48
49	899	961	24	87	50	13	77	42	07	72	38	04	71	39	49
50	900	962	1025	1088	1151	1214	2278	1343	1408	1473	1539	1005	1672	1740	50
51	901	963	26	89	52	16	80	44	09	74	40	06	73	41	51
52	902	964	27	90	53	17	81	45	10	75	41	08	75	42	52
53	903	965	28	91	54	18	82	46	11	76	42	09	76	43	53
54	904	966	29	92	55	19	83	47	12	77	43	10	77	44	54
55	905	968	30	93	56	20	84	48	13	79	44	11	78	45	55
56	906	969	31	94	57	21	85	49	14	80	46	12	79	47	56
57	907	970	32	95	58	22	86	50	15	81	47	13	80	48	57
8	908	971	33	96	59	23	87	52	16	82	48	14	81	49	58
59	909	972	34	97	60	24	88	53	18	83	49	15	82	50	59

A Table of Meridional Parts.

M	28d.	29d.	30d.	31d.	32d.	33d.	34d.	35d.	36d.	37d.	38d.	39d.	40d.	41d.	M
0	1751	1819	1888	1958	2028	2100	2171	2244	2318	2393	2468	2545	2623	2702	0
1	52	21	90	59	30	01	73	45	19	94	70	46	24	03	1
2	53	22	91	60	31	02	74	47	20	95	71	48	25	04	2
3	55	23	92	62	32	03	75	48	22	96	72	49	27	06	3
4	56	24	93	63	33	04	76	49	23	98	73	50	28	07	4
5	57	25	94	64	34	05	78	50	24	99	75	51	29	08	5
6	58	26	95	65	35	07	79	52	25	2400	76	53	31	10	6
7	59	27	96	66	37	08	80	53	27	01	77	54	32	11	7
8	60	29	98	67	38	09	81	54	28	03	78	55	33	12	8
9	61	30	99	69	39	10	82	55	29	04	80	57	34	14	9
10	1762	1831	1900	1970	2040	2111	2184	2256	2330	2405	2481	2558	2636	2715	10
11	64	32	01	71	41	13	85	58	32	06	82	59	37	16	11
12	65	33	02	72	43	14	86	59	33	08	84	60	38	18	12
13	66	34	03	73	44	15	87	60	34	09	85	62	40	19	13
14	67	35	05	74	45	16	88	61	35	10	86	63	41	20	14
15	68	37	06	76	46	17	90	63	37	11	87	64	42	22	15
16	69	38	07	77	47	19	91	64	38	13	89	66	44	23	16
17	70	39	08	78	48	20	92	65	39	14	90	67	45	24	17
18	72	40	09	79	50	21	93	66	40	15	91	68	46	26	18
19	73	41	10	80	51	22	94	68	42	16	92	69	48	27	19
20	1774	1842	1911	1981	2052	2123	2196	2269	2343	2418	2494	2571	2649	2728	20
21	75	43	13	83	53	25	97	70	44	19	95	72	50	29	21
22	76	45	14	84	54	26	98	71	45	20	96	73	51	31	22
23	77	46	15	85	56	27	99	72	46	21	98	75	53	32	23
24	78	47	16	86	57	28	2200	74	48	23	99	76	54	33	24
25	80	48	17	87	58	29	02	75	49	24	2500	77	55	35	25
26	81	49	18	88	59	31	03	76	50	25	01	78	57	36	26
27	82	50	20	90	60	32	04	77	51	27	03	80	58	37	27
28	83	52	21	91	61	33	05	79	53	28	04	81	59	39	28
29	84	53	22	92	63	34	07	80	54	29	05	82	61	40	29
30	1785	1854	1923	1993	2064	2135	2208	2281	2355	2430	2506	2584	2662	2742	30
31	86	55	24	94	65	37	09	82	56	32	08	85	63	43	31
32	87	56	25	95	66	38	10	83	58	33	09	86	65	44	32
33	89	57	27	97	67	39	11	85	59	34	10	88	66	46	33
34	90	58	28	98	69	40	13	86	60	35	12	89	67	47	34
35	91	60	29	99	70	41	14	87	61	37	13	90	69	48	35
36	92	61	30	2000	71	43	15	88	63	38	14	91	70	50	36
37	93	62	31	01	72	44	16	90	64	39	15	93	71	51	37
38	94	63	32	02	73	45	17	91	65	40	17	94	73	52	38
39	96	64	34	04	75	46	19	92	66	42	18	95	74	54	39
40	1797	1805	1935	2005	2076	2147	2220	2293	2368	2443	2519	2597	2675	2755	40
41	98	66	36	06	77	49	21	95	69	44	21	98	76	56	41
42	99	68	37	07	78	50	22	96	70	45	22	99	78	58	42
43	1800	69	38	08	79	51	24	97	71	47	23	2601	79	59	43
44	01	70	39	10	80	52	25	98	73	48	24	02	80	60	44
45	02	71	41	11	82	53	26	99	74	49	26	03	81	62	45
46	03	72	42	12	83	55	27	2301	75	51	27	04	82	63	46
47	05	73	43	13	84	56	28	02	76	52	28	06	84	64	47
48	06	75	44	14	85	57	30	03	78	53	30	07	86	66	48
49	07	76	45	15	86	58	31	04	79	54	31	08	87	67	49
50	1808	1877	1946	2017	2088	2159	2232	2306	2380	2456	2532	2610	2688	2768	50
51	09	78	48	18	89	61	33	07	81	57	33	11	90	70	51
52	10	79	49	19	90	62	35	08	83	58	35	12	91	71	52
53	11	80	50	20	91	63	36	09	84	59	36	14	92	72	53
54	13	81	51	21	92	64	37	11	85	61	37	15	94	74	54
55	14	83	52	22	94	65	38	12	86	62	38	16	95	75	55
56	15	84	53	24	95	67	39	13	88	63	40	17	96	76	56
57	16	85	55	25	96	68	41	14	89	64	41	19	98	78	57
58	17	86	56	26	97	69	42	16	90	66	42	20	99	79	58
59	18	87	57	27	98	70	43	17	91	67	44	21	2700	80	69

A Table of Meridional Parts.

M	42d.	43d.	44d.	45d.	46d.	47d.	48d.	49d.	50d.	51d.	52d.	53d.	54d.	55d.	M
0	2782	2863	2946	3030	3116	3203	3392	2382	3474	3569	3665	3764	3865	3968	0
1	83	64	47	31	17	04	93	84	76	70	67	65	66	70	1
2	84	66	49	33	18	06	95	85	78	72	68	67	68	71	2
3	86	67	50	34	20	07	96	87	79	74	70	69	70	73	3
4	87	69	51	36	21	09	98	88	81	75	72	70	71	75	4
5	88	70	53	37	23	10	99	90	82	77	73	72	73	77	5
6	90	71	54	38	24	12	3301	91	84	78	75	74	75	78	6
7	91	73	56	40	26	13	02	93	85	80	77	75	77	80	7
8	92	74	57	41	27	14	03	94	87	82	78	77	78	82	8
9	94	75	58	43	29	16	05	96	88	83	88	79	80	84	9
10	2795	2877	2960	3044	3130	3217	3306	3397	3490	3585	3681	3780	3882	3985	10
11	97	78	61	46	31	19	08	99	92	86	83	82	83	87	11
12	98	80	63	47	33	20	09	3400	93	88	85	84	85	89	12
13	99	81	64	48	34	22	11	02	95	90	86	85	87	91	13
14	2801	82	65	50	36	23	12	03	96	91	88	87	89	92	14
15	02	84	67	51	37	25	14	05	98	93	90	89	90	94	15
16	03	85	68	53	39	26	16	07	99	94	91	90	92	96	16
17	05	86	70	54	40	28	17	08	3501	96	93	92	94	98	17
18	06	88	71	55	42	29	19	10	03	98	95	94	95	99	18
19	07	89	72	57	43	31	20	11	04	99	96	95	97	4001	19
20	2809	2891	2974	3058	3144	3232	3322	3413	3506	3601	3698	3797	3899	4003	20
21	10	92	75	60	46	34	23	14	07	02	99	99	3901	05	21
22	11	93	76	61	47	35	25	16	09	04	3701	3800	02	06	22
23	13	95	78	63	49	37	26	17	10	06	03	02	04	08	23
24	14	96	79	64	50	38	28	19	12	07	04	04	06	10	24
25	15	97	81	65	52	40	29	20	14	09	06	06	07	12	25
26	17	99	82	67	53	41	31	22	15	10	08	07	09	14	26
27	18	2900	83	68	55	42	32	23	17	12	09	09	11	15	27
28	20	01	85	70	56	44	34	25	18	14	11	11	13	17	28
29	21	03	86	71	57	45	35	27	20	15	13	12	14	19	29
30	2822	2904	2988	3073	3159	3247	3337	3428	3521	3617	3714	3814	3916	4021	30
31	24	06	89	74	60	48	38	30	23	18	16	16	18	22	31
32	25	07	91	75	62	50	40	31	25	20	17	17	19	24	32
33	26	08	92	77	63	51	41	33	26	22	19	19	21	20	33
34	28	10	93	78	65	53	43	34	28	23	21	21	23	28	34
35	29	11	95	80	66	54	44	36	29	25	22	22	25	29	35
36	30	13	96	81	68	56	46	37	31	26	24	24	26	31	36
37	32	14	98	83	69	57	47	39	32	28	26	26	28	33	37
38	33	15	99	84	71	59	49	40	34	30	27	27	30	35	38
39	34	17	3000	85	72	60	50	42	36	31	29	29	32	37	39
40	2836	2918	3002	3087	3173	3262	3352	3443	3537	3633	3731	3831	3933	4038	40
41	37	19	03	88	75	63	53	45	39	34	32	32	35	40	41
42	39	21	05	90	76	65	55	47	40	36	34	34	37	42	42
43	40	22	06	91	78	66	56	48	42	38	36	36	38	44	43
44	41	24	07	93	79	68	58	50	43	39	37	38	40	45	44
45	43	25	09	94	81	69	59	51	45	41	39	39	42	47	45
46	44	26	10	95	82	71	61	53	47	43	41	41	44	49	46
47	45	28	12	97	84	72	62	54	48	44	42	43	45	51	47
48	47	29	13	98	85	74	64	56	50	46	44	44	47	52	48
49	48	31	14	3100	87	75	65	57	51	47	46	46	49	54	49
50	2849	2932	3016	3101	3188	3277	3367	3459	3553	3649	3747	3848	3951	4056	50
51	51	33	17	03	90	78	68	60	55	51	49	49	52	58	51
52	52	35	19	04	91	80	70	62	56	52	50	51	54	60	52
53	54	36	20	06	92	81	71	64	58	54	52	53	56	61	53
54	55	37	21	07	94	83	73	65	59	55	54	55	58	63	54
55	56	39	23	08	95	84	74	67	61	57	55	56	59	65	55
56	58	40	24	10	97	86	76	68	62	59	57	58	61	67	56
57	59	42	26	11	98	87	78	70	64	60	59	60	63	69	57
58	60	43	27	13	3200	89	79	71	66	62	60	61	64	70	58
59	62	44	28	14	01	90	81	[illegible]	68	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

A Table of Meridional Parts.

M.	56d.	57d.	58d.	59d.	60d.	61d.	62d.	63d.	64d.	65d.	66d.	67d.	68d.	9d.	M.
0	4074	4183	4294	4409	4527	4649	4775	4905	5039	5179	5324	5474	5631	5795	0
1	75	84	96	11	29	51	77	07	42	81	26	77	33	97	1
2	76	86	98	13	31	53	79	09	44	84	28	79	36	5800	2
3	77	88	4300	15	33	55	81	12	46	86	31	82	39	03	3
4	81	90	02	17	35	67	84	14	49	88	33	84	41	06	4
5	83	92	04	19	37	60	86	16	51	91	36	87	44	09	5
6	85	94	06	21	39	62	88	18	53	93	38	89	47	11	6
7	86	95	08	23	41	64	90	20	55	95	41	92	50	14	7
8	88	97	09	25	43	66	92	23	58	98	43	95	52	17	8
9	90	99	11	27	45	68	94	25	60	5200	46	97	55	20	9
10	4092	4201	4313	4429	4547	4670	4796	4927	5062	5203	5348	5500	5658	5823	10
11	94	03	15	31	49	72	98	29	65	05	51	02	60	25	11
12	95	05	17	33	51	74	4801	31	67	07	53	05	63	28	12
13	97	07	19	34	53	76	03	34	69	10	56	07	66	31	13
14	99	08	21	36	55	78	05	36	71	12	58	10	68	34	14
15	4101	10	23	38	57	80	07	38	74	14	61	13	71	37	15
16	03	12	25	40	59	82	09	40	76	17	63	15	74	39	16
17	04	14	27	42	61	84	11	43	78	19	66	18	76	42	17
18	06	16	28	44	64	87	14	45	81	22	68	20	79	45	18
19	08	18	30	46	66	89	16	47	83	24	71	23	82	48	19
20	4110	4220	4332	4448	4568	4691	4818	4949	5085	5226	5373	5526	5685	5851	20
21	12	21	34	50	70	93	20	51	88	29	76	28	87	54	21
22	13	23	36	52	72	95	22	54	90	31	78	31	90	56	22
23	15	25	38	54	74	97	24	56	92	34	80	33	93	59	23
24	17	27	40	56	76	99	26	58	95	36	83	36	95	62	24
25	19	29	42	58	78	4701	29	60	97	38	85	39	98	65	25
26	21	31	44	60	80	03	31	63	99	41	88	41	5701	68	26
27	22	32	46	62	82	05	33	65	5102	43	90	44	04	71	27
28	24	34	47	64	84	07	35	67	04	46	93	46	06	74	28
29	26	36	49	66	86	10	37	69	06	48	95	49	09	76	29
30	4128	4238	4351	4465	4588	4712	4839	4972	5208	5250	5398	5552	5712	5879	30
31	30	40	53	70	90	14	42	73	11	53	5401	54	15	82	31
33	32	42	55	72	92	16	44	76	13	55	03	57	17	85	32
32	33	44	57	74	94	18	46	78	15	58	06	59	20	88	33
34	35	46	59	76	96	20	48	81	18	60	08	62	23	91	34
35	37	47	61	78	98	22	50	83	20	63	11	65	25	94	35
36	39	49	63	80	4600	24	52	85	22	65	13	67	28	96	36
37	41	51	65	82	02	26	55	87	25	67	16	70	31	99	37
38	42	53	67	84	04	28	57	90	27	70	18	73	34	5902	38
39	44	55	69	86	06	31	59	92	30	72	21	75	36	05	39
40	4146	4257	4370	4488	4608	4733	4861	4994	5132	5275	5423	5578	5739	5908	40
41	48	59	72	90	10	35	63	96	34	77	26	80	42	11	41
42	50	60	74	92	12	37	65	99	36	80	28	83	45	14	42
43	52	62	76	94	14	39	68	5001	39	82	31	86	47	17	43
44	53	64	78	95	16	41	70	03	41	84	33	88	50	19	44
45	55	66	80	97	18	43	72	05	43	87	36	91	53	22	45
46	57	68	82	99	20	45	74	08	46	89	38	94	56	25	46
47	59	70	84	4501	23	47	76	10	48	92	41	96	58	28	47
48	61	72	86	03	25	50	79	12	51	94	43	99	61	31	48
49	62	74	88	05	27	52	81	14	53	97	46	5602	64	34	49
50	4164	4275	4390	4507	4629	4754	4883	5017	5155	5299	5448	5604	5767	5937	50
51	66	77	92	09	31	56	85	19	58	5301	51	07	70	40	51
52	68	79	94	11	33	58	87	21	60	04	54	10	72	43	52
53	70	81	96	13	35	60	90	23	62	06	56	12	75	46	53
54	72	83	98	15	37	62	92	26	65	09	59	15	78	48	54
55	73	85	99	17	39	64	94	28	67	11	61	17	81	51	55
56	75	87	4401	19	41	66	96	30	69	14	64	20	83	54	56
57	77	89	03	21	43	69	98	33	72	16	66	23	86	57	57
58	79	91	05	23	45	71	4901	35	74	19	69	25	89	60	58
59	81	93	07	25	47	73	03	37	76	21	71	28	92	63	59

A Table of Meridional Parts.

M.	70d.	71d.	72d.	73d.	74d.	75d.	76d.	77d.	78d.	79. d	80d.	81d.	82d.	83d.	M
0	5966	6146	6335	6534	6746	6970	7210	7467	7745	8046	8375	8739	9145	9606	0
1	69	49	38	38	49	74	14	72	49	51	81	45	53	14	1
2	72	52	41	41	53	78	18	76	54	56	87	52	60	22	2
3	75	55	45	45	57	82	22	81	59	61	93	58	67	31	3
4	78	58	48	48	60	86	27	85	64	67	98	65	74	39	4
5	81	61	51	52	64	90	31	90	69	72	8404	71	82	47	5
6	84	64	54	55	68	94	35	94	74	77	10	78	89	55	6
7	86	67	58	58	71	97	39	98	78	83	16	84	96	64	7
8	89	70	61	62	75	7001	43	7503	83	88	22	91	9203	72	8
9	92	73	64	65	79	05	47	07	88	93	27	97	11	80	9
10	5995	6177	5367	6569	6782	7009	7252	7512	7793	8099	8433	8804	9218	9689	10
11	98	80	71	72	86	13	56	16	98	8104	39	10	25	97	11
12	6001	83	74	76	90	17	60	21	7803	09	45	17	33	9706	12
13	04	86	77	79	93	21	64	25	08	15	51	23	40	14	13
14	07	89	80	83	97	25	68	30	13	20	57	30	48	23	14
15	10	92	84	86	6801	29	73	35	17	25	63	36	55	31	15
16	13	95	87	90	04	33	77	39	22	31	69	43	02	40	16
17	16	98	90	93	08	37	81	44	27	36	74	49	70	48	17
18	19	6201	94	96	12	41	85	48	32	41	80	56	77	57	18
19	22	05	97	6600	15	45	89	53	37	47	86	63	85	65	19
20	6025	6208	6400	6603	6819	7049	7294	7557	7842	8152	8492	8869	9292	9774	20
21	28	11	03	07	23	52	98	62	47	58	98	76	9300	83	21
22	31	14	07	10	26	56	7302	66	52	63	8504	83	07	91	22
23	34	17	10	14	30	60	06	71	57	68	10	89	15	9800	23
24	37	20	13	17	34	64	11	76	62	74	16	96	22	09	24
25	40	23	17	21	38	68	15	80	67	79	22	8903	30	17	25
26	43	26	20	24	41	72	19	85	72	85	28	09	37	26	26
27	46	30	23	28	45	76	23	89	77	90	34	16	45	35	27
28	49	33	27	31	49	80	28	94	82	96	40	23	53	44	28
29	52	36	30	35	53	84	32	98	87	8201	46	30	60	52	29
30	6055	2639	6433	6639	6856	7088	7336	7603	7892	8207	8552	8930	9368	9861	30
31	58	42	37	42	60	92	41	08	97	12	58	43	76	70	31
32	61	45	40	46	64	96	45	12	7902	18	65	50	83	79	32
33	64	49	43	49	68	7100	49	17	07	23	71	57	91	88	33
34	67	52	47	53	71	04	53	22	12	29	77	63	99	97	34
35	70	55	50	56	75	08	58	26	17	34	83	70	9407	9906	35
36	73	58	53	60	79	12	62	31	22	40	89	77	14	15	36
37	76	61	57	63	83	16	66	36	27	45	95	84	22	24	37
38	79	64	60	67	86	20	71	40	32	1	8601	91	30	33	38
39	82	68	63	70	90	24	75	45	37	56	07	98	38	42	39
40	6085	6271	6407	6674	6894	7128	7379	7650	7942	8262	8614	9005	9445	9951	40
41	88	74	70	77	98	32	84	54	48	67	20	12	53	59	41
42	91	77	73	81	6901	36	88	59	53	73	26	18	61	69	42
43	94	80	77	85	05	40	92	64	58	79	32	25	69	78	43
44	97	83	80	88	09	45	97	68	63	84	38	32	77	87	44
45	6100	87	83	92	13	49	7401	73	68	90	44	39	85	96	45
46	03	90	87	95	17	53	06	78	73	95	51	46	93	10005	46
47	06	93	90	99	10	57	10	83	78	8301	57	53	9501	10015	47
48	09	96	94	6702	24	61	14	87	83	07	63	60	09	10024	48
49	12	99	97	06	28	65	19	92	89	12	69	67	17	10033	49
50	6115	6303	6500	6710	6932	7169	7423	7697	7994	8218	8676	9074	9525	10043	50
51	18	06	04	13	36	73	27	7702	99	24	82	81	33	10052	51
52	21	09	07	17	40	77	32	06	8004	29	88	88	41	10061	52
53	24	12	11	20	43	81	36	11	09	35	95	96	49	10071	53
54	27	15	14	24	47	85	41	16	14	41	8701	9103	57	10080	54
55	30	19	17	28	51	89	45	21	20	47	07	10	65	10089	55
56	33	22	21	31	55	94	49	25	25	52	14	17	73	10099	56
57	36	25	24	35	59	98	54	30	30	58	20	24	81	10108	57
58	40	28	28	38	63	7202	58	35	35	64	26	31	89	10118	58
59	43	32	31	42	66	06	63	40	40	69	33	38	98	10127	59

A TABLE for finding the HOUR.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
0	30	2.66121	2.63982	9.37654 } Co. ar.	30	30	0.87717	4.42386	2.94656
1	00	2.36018	2.94085	97860 }	31	00	87015	43088	96067
1	30	2.18409	3.11694	0.33078	31	30	86324	43779	97454
2	00	2.05916	24187	58066	32	00	85644	44459	98820
2	30	1.96225	33878	77448	32	30	84976	45127	3.00164
3	00	88307	41796	93284	33	00	84317	45786	01488
3	30	81613	48490	1.06673	33	30	83669	46434	02792
4	00	75814	54289	18271	34	00	83030	47073	04077
4	30	70700	59403	28502	34	30	82400	47703	05342
5	00	66125	63978	37653	35	00	81780	48323	06590
5	30	1.61986	3.68117	1.45931	35	30	0.81169	4.48934	3.07819
6	00	58208	71895	53488	36	00	80567	49536	09032
6	30	54733	75370	60440	36	30	79973	50130	10227
7	00	51515	78588	66877	37	00	79387	50716	11406
7	30	48520	81583	72869	37	30	78809	51294	12570
8	00	45718	84385	78474	38	00	78239	51864	13718
8	30	43086	87017	83739	38	30	77677	52426	14850
9	00	40605	89498	88703	39	00	77122	52981	15969
9	30	38258	91845	93399	39	30	76574	53529	17072
10	00	36032	94071	97854	40	00	76033	54070	18162
10	30	1.33915	3.96188	2.02091	40	30	0.75499	4.54604	3.19238
11	00	31896	98207	06131	41	00	74972	55131	20301
11	30	29967	4.00136	09991	41	30	74451	55652	21351
12	00	28120	01983	13687	42	00	73937	56166	22389
12	30	26349	03754	17232	42	30	73429	56674	23414
13	00	24647	05456	20638	43	00	72926	57176	24427
13	30	23010	08093	23915	43	30	72430	57673	25428
14	00	21432	08671	27073	44	00	71940	58163	26418
14	30	19910	10193	30120	44	30	71455	58648	27396
15	00	18440	11663	33063	45	00	70976	59127	28363
15	30	1.17018	4.13085	2.35910	45	30	0.70503	4.59600	3.29320
16	00	15642	14461	38667	46	00	70034	60069	30266
16	30	14307	15796	41338	46	30	69571	60532	31202
17	00	13013	17090	43930	47	00	69113	60990	32128
17	30	11757	18346	46447	47	30	68660	61443	33044
18	00	10536	19567	48893	48	00	68212	61891	33950
18	30	09348	20755	51271	48	30	67769	62334	34847
19	00	08193	21910	53586	49	00	67330	62773	35734
19	30	07067	23036	55841	49	30	66896	63207	36613
20	00	05970	24133	58039	50	00	66466	63637	37482
20	30	1.04901	4.25202	2.60182	50	30	0.66041	4.64062	3.38343
21	00	03857	26246	62274	51	00	65620	64483	39195
21	30	02838	27265	64316	51	30	65204	64899	40039
22	00	01843	28260	66312	52	00	64791	65312	40875
22	30	00870	29233	68262	52	30	64383	65720	41702
23	00	0.99918	30185	70170	53	00	63978	66125	42523
23	30	98988	31115	72036	53	30	63578	66525	43334
24	00	98077	32026	73863	54	00	63181	66922	44138
24	30	97184	32919	75652	54	30	62789	67314	44935
25	00	96310	33793	77505	55	00	62400	67703	45724
25	30	0.95454	4.34649	2.79124	55	30	0.62014	4.68089	3 46507
26	00	94614	35489	80809	56	00	61632	68471	47282
26	30	93791	36312	82461	56	30	61254	68849	48050
27	00	92982	37121	84083	57	00	60879	69224	48811
27	30	92189	37914	85675	57	30	60508	69595	49566
8	00	91411	38692	87238	58	00	60140	69963	50314
28	30	90646	39457	88773	58	30	59775	70328	51056
28	00	89894	40209	90282	59	00	59414	70689	51791
29	30	89156	40947	91765	59	30	59056	71047	52520
20	00	88430	41673	93223	60	00	58700	71403	53243

LATITUDE by two Altitudes.

1 HOUR.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0.58348	4.71755	3.53959	30	30	0.41488	4.88615	3.88625
01	00	57999	72104	54670	31	00	41261	88842	89097
01	30	57653	72450	55375	31	30	41036	89067	89567
02	00	57310	72793	56074	32	00	40812	89291	90034
02	30	56970	73133	56767	32	30	40590	89513	90498
03	00	56633	73470	57455	33	00	40368	89734	90960
03	30	56298	73805	58137	33	30	40149	89954	91420
04	00	55966	74137	58814	34	00	39930	90173	91876
04	30	55637	74466	59486	34	30	39713	90390	92331
05	00	55311	74792	60152	35	00	39497	90606	92782
05	30	0.54987	4.75116	3.60813	35	30	0.39282	4.90821	3.93232
06	00	54666	75437	61469	36	00	39069	91034	93679
06	30	54347	75756	62120	36	30	38856	91247	94123
07	00	54031	76072	62766	37	00	38646	91457	94566
07	30	53718	76385	63407	37	30	38436	91667	95005
08	00	53406	76697	64043	38	00	38227	91876	95443
08	30	53097	77005	64675	38	30	38020	92083	95878
09	00	52791	77312	65302	39	00	37814	92289	96311
09	30	52487	77616	65924	39	30	37609	92494	96742
10	00	52186	77917	66542	40	00	37405	92698	97170
10	30	0.51886	4.78217	3.67156	40	30	0.37203	4.92900	3.97597
11	00	51589	78514	67765	41	00	37001	93102	98021
11	30	51294	78809	68369	41	30	36801	93302	98443
12	00	51002	79101	68969	42	00	36602	93501	98862
12	30	50711	79392	69566	42	30	36403	93700	99280
13	00	50423	79680	70158	43	00	36206	93897	99696
13	30	50137	79966	70745	43	30	36011	94092	4.00109
14	00	49852	80251	71329	44	00	35816	94287	00521
14	30	49570	80533	71909	44	30	35622	94481	00930
15	00	49290	80813	72485	45	00	35429	94673	01337
15	30	0.49012	4.81091	3.73057	45	30	0.35238	4.94865	4.01743
16	00	48736	81367	73625	46	00	35047	95056	02146
16	30	48462	81641	74189	46	30	34858	95245	02547
17	00	48189	81914	74750	47	00	34669	95434	02947
17	30	47919	82184	75307	47	30	34482	95621	03344
18	00	47650	82453	75860	48	00	34295	95808	03740
18	30	47384	82719	76409	48	30	34110	95993	04134
19	00	47119	82984	76955	49	00	33925	96178	04526
19	30	46856	83247	77498	49	30	33742	96361	04916
20	00	46595	83508	78037	50	00	33559	96544	05304
20	30	0.46335	4.83768	3.78573	50	30	0.33378	4.96725	4.05690
21	00	46078	84025	79105	51	00	33197	96906	06074
21	30	45822	84281	79634	51	30	33018	97085	06457
22	00	45567	84536	80159	52	00	32839	97264	06838
22	30	45315	84788	80682	52	30	32661	97442	07217
23	00	45064	85039	81201	53	00	32485	97618	07595
23	30	44815	85288	81717	53	30	32309	97794	07970
24	00	44567	85536	82230	54	00	32134	97969	08344
24	30	44321	85782	82739	54	30	31960	98143	08716
25	00	44077	86026	83246	55	00	31787	98316	09087
25	30	0.43834	4.86269	3.83749	55	30	0.31614	4.98489	4.09456
26	00	43592	86511	84250	56	00	31443	98660	09823
26	30	43353	86750	84748	56	30	31272	98831	10188
27	00	43114	86989	85242	57	00	31103	99000	10552
27	30	42878	87225	85734	57	30	30934	99169	10914
28	00	42642	87461	86223	58	00	30766	99337	11275
28	30	42409	87694	86709	58	30	30599	99504	11634
29	00	42176	87927	87192	59	00	30433	99670	11992
29	30	41945	88158	87672	59	30	30268	99835	12348
30	00	41716	88387	88150	60	00	30103	5.00000	12702

A TABLE for finding the 2 HOURS.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
01	30	0.29939	5.00164	4.13055	30	30	0.21432	5.08671	4.31801
01	00	29776	00327	13406	31	00	21309	08794	32079
02	30	29614	00489	13756	31	30	21187	08916	32355
02	00	29453	00650	14104	32	00	21066	09037	32631
03	30	29293	00810	14451	32	30	20945	09158	32906
03	00	29133	00970	14797	33	00	20824	09279	33180
04	30	28974	01129	15140	33	30	20704	09399	33452
04	00	28816	01287	15483	34	00	20585	09518	33724
04	30	28659	01444	15824	34	30	20466	09637	33995
05	00	28502	01601	16163	35	00	20348	09755	34265
05	30	0.28346	5.01757	4.16501	35	30	0.20230	5.09873	4.34534
06	00	28191	01912	16838	36	00	20113	09990	34802
06	30	28037	2066	17173	36	30	19996	10107	35069
07	00	27884	02219	17507	37	00	19880	10223	35335
07	30	27731	02372	17839	37	30	19764	10339	35600
08	00	27579	02524	18171	38	00	19648	10454	35865
08	30	27428	02675	18500	38	30	19534	10569	36128
09	00	27277	02826	18829	39	00	19420	10683	36391
09	30	27127	02976	19156	39	30	19306	10797	36652
10	00	26978	03125	19482	40	00	19193	10910	36913
10	30	0.26830	5.03273	4.19806	40	30	0.19080	5.11023	4.37173
11	00	26682	03421	20129	41	00	18968	11135	37432
11	30	.26535	03568	20451	41	30	18857	11246	37690
12	00	26389	03714	20771	42	00	18746	11357	37948
12	30	26244	03859	21091	42	30	18635	11468	38204
13	00	26099	04004	21409	43	00	18525	11578	38460
13	30	25955	04148	21725	43	30	18415	11688	38714
14	00	25811	04292	22041	44	00	18306	11797	38968
14	30	25668	04435	22355	44	30	18197	11906	39221
15	00	25526	04577	22668	45	00	18089	12014	39473
15	30	0.25385	5.04718	4.22980	45	30	0.17981	5.12122	4.39724
16	00	25244	04859	23290	46	00	17874	12229	39975
16	30	25104	04999	23599	46	30	17767	12336	40225
17	00	24964	05139	23907	47	00	17660	12443	40474
17	30	24825	05278	24214	47	30	17554	12549	40722
18	00	24687	05416	24520	48	00	17449	12654	40969
18	30	24550	05553	24825	48	30	17344	12759	41215
19	00	24413	05690	25128	49	00	17239	12864	41461
19	30	24277	05826	25430	49	30	17135	12968	41706
20	00	24141	05962	25731	50	00	17031	13071	41950
20	30	0.24006	5.06097	4.26031	50	30	0.16928	5.13174	4.42193
21	00	23871	06232	26330	51	00	16826	13277	42435
21	30	23738	06365	26628	51	30	16724	13379	42677
22	00	23605	06498	26924	52	00	16622	13481	42918
22	30	23472	06631	27220	52	30	16520	13583	43158
23	00	23340	06763	27514	53	00	16419	13684	43398
23	30	23209	06894	27807	53	30	16319	13784	43636
24	00	23078	07025	28099	54	00	16219	13884	43874
24	30	22948	07155	28391	54	30	16119	13984	44111
25	00	22819	07284	28681	55	00	16020	14083	44384
25	30	0.22690	5.07413	4.28969	55	30	0.15921	5.14182	4.44583
26	00	22561	07542	29257	56	00	15823	14280	44818
26	30	22433	07670	29544	56	30	15725	14378	45052
27	00	22306	07797	29830	57	00	15627	14476	45286
27	30	22180	07923	30115	57	30	15530	14573	45518
28	00	22054	08049	30398	58	00	15434	14669	45750
28	30	21928	08175	30681	58	30	15338	14765	45981
29	00	21803	08300	30963	59	00	15242	14861	46212
29	30	21679	08424	31244	59	30	15146	14957	46442
30	00	21555	08548	31523	60	00	15051	15052	46671

LATITUDE by Two Altitudes.

3 HOURS.

M	S.	½ Elapſ. Time.	Middle Time	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0. 14957	5. 15146	4. 46899	30	30	0. 09981	5. 20122	4. 59436
01	00	14863	15247	47127	31	00	09909	20194	59627
01	30	14769	15334	47354	31	30	09837	20266	59818
02	00	14676	15427	47580	32	00	09766	20338	60008
02	30	14583	15520	47806	32	30	09694	20409	60198
03	00	14490	15613	48031	33	00	09623	20480	60388
03	30	14398	15705	48255	33	30	09552	20551	60577
04	00	14306	15797	48479	34	00	09482	20621	60765
04	30	14215	15888	48702	34	30	09412	20691	60952
05	00	14124	15979	48924	35	00	09342	20760	61139
05	30	0. 14034	5. 16069	4. 49145	35	30	0. 09273	5. 20830	4. 61326
06	00	13944	16159	49366	36	00	09204	20899	61512
06	30	13854	16249	49586	36	30	09135	20268	61698
07	00	13765	16338	49806	37	00	09067	21036	61883
07	30	13676	16427	50025	37	30	08999	21104	62068
08	00	13587	16516	50243	38	00	08931	21172	62252
08	30	13499	16604	50460	38	30	08864	21239	62436
09	00	13411	16692	50677	39	00	08797	21306	62619
09	30	13324	16779	50893	39	30	08730	21373	62802
10	00	13237	16866	51109	40	00	08664	21439	62984
10	30	0. 13150	5. 16953	4. 51329	40	30	0. 08597	5. 21505	4. 63166
11	00	13064	17039	51534	41	00	08531	21571	63347
11	30	12971	17125	51753	41	30	08466	21637	63528
12	00	12893	17210	51966	42	00	08401	21702	63708
12	30	12808	17295	52178	42	30	08336	21767	63888
13	00	12723	17380	52390	43	00	08271	21832	64067
13	30	12638	17465	52001	43	30	08207	21896	64246
14	00	12554	17549	52812	44	00	08143	21960	64425
14	30	12474	17633	53022	44	30	08079	22025	64603
15	00	12487	17716	53231	45	00	08015	22088	64780
15	30	0. 12305	5. 17799	4. 53440	45	30	0. 07952	5. 22151	4. 64957
16	00	12222	17881	53648	46	00	07889	22214	65134
16	30	12140	17963	53856	46	30	07827	22276	65310
17	00	12058	18045	54063	47	00	07765	22338	65486
17	30	11977	18126	54269	47	30	07703	22400	65666
18	00	11896	18207	54475	48	00	07641	22462	65806
18	30	11815	18288	54680	48	30	07579	22524	66010
19	00	11734	18369	54885	49	00	07518	22585	66184
19	30	11654	18449	55089	49	30	07457	22646	66357
20	00	11574	18529	55293	50	00	07397	22707	66539
20	30	0. 11495	5. 18608	4. 55496	50	30	0. 07337	5. 22766	4. 66702
21	00	11416	18687	55698	51	00	07277	22826	66874
21	30	11337	18766	55900	51	30	07217	22886	67046
22	00	11259	18844	56101	52	00	07158	22945	67217
22	30	11181	18922	56301	52	30	07099	23004	67388
23	00	11104	18999	56501	53	00	07040	23062	67558
23	30	11027	19076	56701	53	30	06981	23123	67728
24	00	10950	19153	56900	54	00	06923	23180	67897
24	30	10873	19230	57098	54	30	06865	23238	68066
25	00	10797	19306	57296	55	00	06808	23295	68235
25	30	0. 10721	5. 19382	4. 57494	55	30	0. 06751	5. 23352	4. 68403
26	00	10645	19458	57690	56	00	06694	23409	68571
26	30	10570	19533	57886	56	30	06637	23466	68738
27	00	10495	19608	58082	57	00	06580	23523	68905
27	30	10421	19682	58277	57	30	06524	23579	69071
28	00	10347	19756	58471	58	00	06468	23635	69237
28	30	10273	19830	58665	58	30	06412	23691	69403
29	00	10199	19904	58859	59	00	06357	23746	69568
29	30	10126	19977	59052	59	30	06302	23801	69733
30	00	10053	10050	59244	60	00	06247	23856	69897

A TABLE for finding the
4 HOURS.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0.06192	5.23911	4.70001	30	30	0.03399	5.26704	4.79193
01	00	06138	23965	70224	31	00	03360	26743	79334
01	30	06084	24019	70387	31	30	03321	26782	79475
02	00	06030	24073	70550	32	00	03283	26820	79616
02	30	05977	24126	70712	32	30	03245	26858	79756
03	00	05924	24179	70874	33	00	03207	26896	79896
03	30	05871	24232	71036	33	30	03170	26934	80036
04	00	05818	24285	71197	34	00	03132	26971	80175
04	30	05766	24337	71352	34	30	03095	27008	80314
05	00	05714	24389	71518	35	00	03058	27045	80452
05	30	0.05662	5.24441	4.71678	35	30	0.03021	5.27082	4.80591
06	00	05610	24493	71837	36	00	02985	27118	80729
06	30	05559	24544	71996	36	30	02949	27154	80867
07	00	05508	24595	72155	37	00	02913	27190	81004
07	30	05457	24646	72313	37	30	02877	27226	81441
08	00	05406	24697	72471	38	00	02841	27262	81278
08	30	05356	24747	72628	38	30	02806	27297	81414
09	00	05306	24797	72786	39	00	02771	27332	81550
09	30	05256	24847	72942	39	30	02736	27367	81686
10	00	05207	24897	73098	40	00	02701	27402	81821
10	30	0.05158	5.24945	4.73254	40	30	0.02667	5.27436	4.81956
11	00	05109	24994	73410	41	00	02633	27470	82091
11	30	05060	25043	73565	41	30	02599	27504	82226
12	00	05012	25091	73720	42	00	02565	27538	82360
12	30	04964	25139	73874	42	30	02532	27571	82494
13	00	04916	25187	74028	43	00	02499	27604	82628
13	30	04868	25235	74182	43	30	02466	27637	82761
14	00	04821	25282	74335	44	00	02433	27670	82894
14	30	04774	25329	74488	44	30	02400	27703	83027
15	00	04727	25376	74641	45	00	02368	27735	83159
15	30	0.04680	5.25423	4.74793	45	30	0.02336	5.27767	4.83291
16	00	04634	25469	74945	46	00	02304	27799	83423
16	30	04588	25515	75096	46	30	02272	27831	83554
17	00	04542	25561	75247	47	00	02241	27362	83685
17	30	04496	25607	75398	47	30	02210	27893	83816
18	00	04451	25652	75549	48	00	02179	27924	83947
18	30	04406	25697	75699	48	30	02148	27955	84077
19	00	04361	25742	75848	49	00	02118	27985	84207
19	30	04316	25787	75997	49	30	02088	28015	84337
20	00	04272	25831	76146	50	00	02058	28045	84466
20	30	0.04228	5.25875	4.76295	50	30	0.02028	5.28075	4.84595
21	00	04184	25919	76443	51	00	01998	28105	84724
21	30	04141	25962	76591	51	30	01969	28134	84853
22	00	04098	26005	76738	52	00	01940	28163	84981
22	30	04055	26048	76885	52	30	01911	28192	85109
23	00	04012	26091	77032	53	00	01882	28221	85236
23	30	03969	26134	77197	53	30	01854	28249	85363
24	00	03927	26176	77325	54	00	01826	28277	85490
24	30	03885	26218	77471	54	30	01798	28305	85617
25	00	03843	26260	77616	55	00	01770	28333	85744
25	30	0.03801	5.26302	4.77761	55	30	0.01743	5.28360	4.85870
26	00	03760	26343	77906	56	00	01716	28387	85996
26	30	03719	26384	78050	56	30	01689	28414	86121
27	00	03678	26425	78194	57	00	01662	28441	86246
27	30	03638	26466	78338	57	30	01635	28468	86371
28	00	03597	26506	78481	58	00	01609	28494	86496
28	30	03557	26546	78624	58	30	01583	28520	86621
29	00	03517	26586	78767	59	00	01557	28546	86745
29	30	03478	26626	78909	59	30	01531	28572	86869
30	00	03438	26665	79051	60	00	01501	28598	86993

LATITUDE by Two Altitudes.

5 HOURS.

M	S.	½ Elapſ. Time.	Middle Time.	Riſing.	M	S.	½ Elapſ. Time.	Middle Time.	Riſing.
00	30	0.01480	5.28623	4.87116	30	30	0.00361	5.29742	4.94033
01	00	01455	28648	87239	31	00	00349	29754	94141
01	30	01430	28673	87362	31	30	00337	29766	94248
02	00	01405	28698	87484	32	00	00325	29778	94356
02	30	01381	28722	87606	32	30	00313	29790	94463
03	00	01357	28746	87728	33	00	00302	29801	94570
03	30	01333	28770	87850	33	30	00291	29812	94676
04	00	01309	28794	87971	34	00	00280	29823	94782
04	30	01286	28817	88092	34	30	00269	29834	94888
05	00	01263	28840	88213	35	00	00259	29844	94994
05	30	0.01240	5.28863	4.88334	35	30	0.00249	5.29854	4.95100
06	00	01217	28886	88454	36	00	00239	29864	95205
06	30	01194	28909	88574	36	30	00229	29874	95310
07	00	01172	28931	88694	37	00	00219	29884	95415
07	30	01150	28953	88814	37	30	00209	29894	95520
08	00	01128	28975	88933	38	00	00200	29903	95624
08	30	01106	28997	89052	38	30	00191	29912	95728
09	00	01084	29019	89171	39	00	00182	29921	95832
09	30	01063	29040	89289	39	30	00174	29929	95936
10	00	01042	29061	89407	40	00	00166	29937	96020
10	30	0.01021	5.29082	4.89525	40	30	0.00157	5.29945	4.96143
11	00	01000	29103	89643	41	00	00150	29953	96246
11	30	00980	29123	89760	41	30	00142	29961	96349
12	00	00960	29143	89877	42	00	00134	29969	96452
12	30	00940	29163	89994	42	30	00127	29976	96554
13	00	00920	29183	90111	43	00	00120	29983	96656
13	30	00900	29203	90227	43	30	00113	29990	96758
14	00	00881	29222	90343	44	00	00106	29997	96860
14	30	00862	29241	90459	44	30	00099	30004	96961
15	00	00843	29260	90575	45	00	00093	30010	97062
15	30	0.00824	5.29279	4.90690	45	30	0.00087	5.30016	4.97163
16	00	00805	29298	90805	46	00	00081	30022	97264
16	30	00787	29316	90920	46	30	00075	30028	97365
17	00	00769	29334	91035	47	00	00070	30033	97465
17	30	00751	29352	91149	47	30	00065	30038	97565
18	00	00733	29370	91263	48	00	00060	30043	97665
18	30	00716	29387	91377	48	30	00055	30048	97765
19	00	00699	29404	91490	49	00	00050	30053	97865
19	30	00682	29421	91603	49	30	00045	30058	97964
20	00	00665	29438	91716	50	00	00041	30062	98063
20	30	0.00648	5.29455	4.91829	50	30	0.00037	5.30066	4.98162
21	00	00632	29471	91942	51	00	00033	30070	98261
21	30	00616	29487	92054	51	30	00029	30074	98359
22	00	00600	29503	92166	52	00	00026	30077	98457
22	30	00584	29519	92278	52	30	00023	30080	98555
23	00	00568	29535	92390	53	00	00020	30083	98653
23	30	00553	29550	92501	53	30	00017	30086	98751
24	00	00538	29565	92612	54	00	00015	30088	98848
24	30	00523	29580	92723	54	30	00012	30090	98945
25	00	00508	29595	92834	55	00	00010	30092	99042
25	30	0.00494	5.29609	4.92944	55	30	0.00008	5.30094	4.99139
26	00	00480	29623	93054	56	00	00007	30096	99236
26	30	00466	29637	93164	56	30	00005	30098	99332
27	00	00452	29651	93274	57	00	00004	30099	99428
27	30	00438	29665	93383	57	30	00003	30100	99524
28	00	00425	29678	93492	58	00	00002	30101	99620
28	30	00412	29691	93601	58	30	00001	30102	99715
29	00	00399	29704	93709	59	00	00000	30103	99810
29	30	00386	29717	93817	59	30	00000	30103	99905
30	00	00373	29730	93925	60	00	00000	30103	5.00000

A TABLE OF NATURAL SINES.

	0		1		2		3		4		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	
0	00	10000	1745	99985	3490	99939	5254	99863	6976	99756	60
1	29	0000	1774	985	3519	938	5263	861	7005	754	59
2	58	0000	1803	984	3548	937	5292	860	7034	752	58
3	87	0000	1832	984	3577	936	5321	858	7063	750	57
4	116	0000	1862	983	3606	935	5350	857	7092	748	56
5	145	0000	1891	983	3635	934	5379	855	7121	746	55
6	175	0000	1920	982	3664	933	5408	854	7150	744	54
7	204	1000	1949	99981	3693	99932	5437	99852	7179	99742	53
8	233	0000	1978	980	3723	931	5466	851	7208	740	52
9	262	0000	2007	980	3752	930	5495	849	7237	738	51
10	291	0000	2036	979	3781	929	5524	847	7266	736	50
11	323	99999	2065	979	3810	927	5553	846	7295	734	49
12	349	999	2094	978	3839	926	5582	844	7324	731	48
13	378	99999	2123	99977	3868	99925	5611	99842	7353	99729	47
14	407	999	2152	977	3897	924	5640	841	7382	728	46
15	436	999	2181	976	3926	923	5669	839	7411	725	45
16	465	999	2211	976	3955	922	5698	838	7440	723	44
17	495	999	2240	975	3984	921	5727	836	7469	721	43
18	524	999	2269	974	4013	919	5756	834	7498	719	42
19	553	99998	2298	99974	4042	99918	5785	99833	7527	99716	41
20	58	998	2327	973	4071	917	5814	831	7556	714	40
21	611	998	2356	972	4100	916	5844	829	7585	712	39
22	640	998	2385	972	4129	915	5873	827	7614	710	38
23	669	998	2414	971	4159	914	5902	826	7643	708	37
24	698	998	2443	970	4188	912	5931	824	7672	705	36
25	727	99997	2472	99969	4217	99911	5960	99822	7701	99703	35
26	756	997	2501	969	4246	910	5989	821	7730	701	34
27	785	997	2530	968	4275	909	6018	819	7759	699	33
28	814	997	2560	967	4304	907	6047	817	7788	696	32
29	844	996	2589	966	4333	906	6076	815	7817	694	31
30	873	996	2618	966	4362	905	6105	813	7846	692	30
31	902	99996	2647	99965	4391	99904	6134	99812	7875	99689	29
32	931	996	2676	964	4420	902	6163	810	7904	687	28
33	960	995	2705	963	4449	901	6192	808	7933	685	27
34	989	995	2734	963	4478	900	6221	806	7962	683	26
35	1018	995	2763	962	4507	898	6250	804	7991	680	25
36	1047	995	2792	961	4536	897	6279	803	8020	678	24
37	1076	99994	2821	99960	4565	99896	6308	99801	8049	99676	23
38	1105	994	2850	959	4594	894	6337	799	8078	673	22
39	1134	994	2879	959	4623	893	6366	797	8107	671	21
40	1164	993	2908	958	4653	892	6395	795	8136	668	20
41	1193	993	2938	957	4682	890	6424	793	8165	666	19
42	1222	993	2967	956	4711	889	6453	792	8194	664	18
43	1251	99992	2996	99955	4740	99888	6482	99790	8223	99661	17
44	1280	992	3025	954	4769	886	6511	788	8252	659	16
45	1309	991	3054	953	4798	885	6540	786	8281	657	15
46	1338	991	3083	952	4827	883	6569	784	8310	654	14
47	1367	991	3112	952	4856	882	6590	782	8339	652	13
48	1396	990	3141	951	4885	881	6627	780	8368	649	12
49	1425	99990	3170	99950	4914	99879	6656	99778	8397	99647	11
50	1454	999	3199	949	4943	878	6685	776	8426	644	10
51	1483	989	3228	948	4972	876	6714	774	8455	642	9
52	1513	989	3257	947	5001	875	6743	772	8484	639	8
53	1542	988	3286	946	5030	873	6773	770	8513	637	7
54	1571	988	3316	945	5059	872	6802	768	8542	635	6
55	1600	99987	3345	99944	5088	99870	6831	99766	8571	93632	5
56	1629	987	3374	943	5117	869	6860	764	8600	630	4
57	1658	986	3403	942	5146	867	6889	762	8629	627	3
58	1687	986	3432	941	5175	866	6918	760	8658	625	2
59	1716	985	3461	940	5205	864	6947	758	8687	632	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	89		88		87		86		85		

A TABLE of Natural Sines.

	5		6		7		8		9		
M	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M
0	8716	99619	10453	99452	12187	99255	13917	99027	15643	98769	60
1	8745	617	482	449	216	251	946	023	672	764	59
2	8774	614	511	446	245	248	975	019	701	760	58
3	8803	612	540	443	274	244	14004	015	730	755	57
4	8831	609	569	440	302	240	033	011	758	751	56
5	8860	607	597	437	331	237	061	006	787	746	55
6	8889	604	626	434	360	233	090	002	816	741	54
7	8918	99602	10655	99431	12389	99230	14119	98998	15845	98737	53
8	8947	599	684	428	418	226	148	994	873	732	52
9	8976	596	713	424	447	222	177	990	902	728	51
10	9005	594	742	421	476	219	205	986	931	723	50
11	9034	591	771	418	504	215	234	982	959	718	49
12	9063	588	800	415	533	211	263	978	988	714	48
13	9092	99586	10829	99412	12562	99208	14292	98973	16017	98709	47
14	9121	583	858	409	691	204	320	969	039	704	46
15	9150	580	847	406	620	200	349	965	074	700	45
16	9179	578	986	402	649	197	378	961	103	695	44
17	9208	575	945	399	678	193	407	957	132	690	43
18	9237	572	973	396	706	189	436	953	160	686	42
19	9266	99570	11002	99393	12735	99186	14464	98948	16189	98681	41
20	9295	567	031	390	764	182	493	944	218	676	40
21	9324	564	060	386	793	178	522	940	246	671	39
22	9353	562	089	383	822	175	551	936	275	667	38
23	9382	559	118	380	851	171	580	931	304	662	37
24	9411	556	147	377	880	167	608	927	333	657	36
25	9440	99553	11176	99374	12908	99163	14637	98923	16361	98652	35
26	9469	551	205	370	937	160	666	919	390	648	34
27	9498	548	234	367	966	156	695	914	419	643	33
28	9527	545	263	364	995	152	723	910	447	638	32
29	9556	542	291	360	13024	148	752	906	476	633	31
30	9585	540	320	357	053	144	781	902	505	629	30
31	9614	99537	11349	99354	13081	99141	14810	98897	16533	98624	29
32	9642	534	378	351	110	137	838	893	562	619	28
33	9671	531	407	347	139	133	867	889	591	614	27
34	9700	528	436	344	168	129	896	884	620	609	26
35	9729	526	465	341	197	125	925	880	648	604	25
36	9758	523	494	337	226	122	954	876	677	600	24
37	9787	99520	11523	99334	13254	99118	14982	98871	16706	98595	23
38	9816	517	552	331	283	114	15011	867	734	590	22
39	9845	514	580	327	312	110	040	863	763	585	21
40	9874	511	609	324	341	106	069	858	792	580	20
41	9903	508	638	320	370	102	097	854	820	575	19
42	9932	506	667	317	399	098	126	849	849	570	18
43	9961	99503	11696	99314	13427	99094	15155	98845	16878	98565	17
44	9990	500	725	310	456	091	184	841	906	561	16
45	10019	497	754	307	485	087	212	836	935	556	15
46	10048	494	783	303	514	083	241	832	964	551	14
47	10077	491	812	300	543	079	270	827	992	546	13
48	10106	488	840	297	572	075	299	823	17021	541	12
49	10135	99485	11869	99293	13600	99071	15327	98818	17050	98536	11
50	10164	482	898	290	629	067	356	814	078	531	10
51	10192	479	927	286	658	063	385	809	107	526	9
52	10221	476	956	283	687	054	414	805	136	521	8
53	10250	473	985	279	716	055	442	800	164	516	7
54	10279	470	12014	276	744	051	471	796	193	511	6
55	10308	99467	12043	99272	13773	99047	15500	98791	17222	98506	5
56	10337	464	071	269	802	043	529	787	250	501	4
57	10366	461	100	265	831	039	557	782	279	496	3
58	10395	458	129	262	860	035	586	778	308	491	2
59	10424	455	158	258	889	031	615	773	336	486	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	84		83		82		81		80		

M·m

A TABLE of Natural Sines.

	10		11		12		13		14		
M	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	M
0	17365	98481	19081	98163	20791	97815	22495	97437	24192	97030	60
1	393	476	109	157	820	809	523	430	220	023	59
2	422	471	138	152	848	803	552	424	249	015	58
3	451	466	167	146	877	797	580	417	277	008	57
4	479	460	195	140	905	790	608	411	305	001	56
5	508	455	224	135	933	784	637	404	333	96994	55
6	537	450	252	129	962	778	665	398	361	987	54
7	17565	98445	19281	98124	20990	97772	22693	97391	24390	96980	53
8	594	440	309	118	21019	766	722	384	418	973	52
9	623	435	338	112	047	760	750	378	446	966	51
10	651	430	366	107	076	754	778	371	474	959	50
11	680	425	395	101	104	748	807	365	503	952	49
12	708	420	423	096	132	742	835	358	531	945	48
13	17737	98414	19452	98090	21161	97735	22863	97351	24559	96937	47
14	766	409	480	084	189	729	892	335	587	930	46
15	794	404	509	079	218	723	920	338	615	923	45
16	823	399	538	073	246	717	948	331	644	916	44
17	852	394	566	067	275	711	977	325	672	909	43
18	880	388	595	061	303	705	23005	318	700	902	42
19	17909	98383	19623	98056	21331	97698	23033	97311	24728	96894	41
20	937	378	652	050	360	692	062	304	756	887	40
21	966	373	680	044	388	686	090	298	784	880	39
22	995	368	709	039	417	680	118	291	813	873	38
23	18023	362	737	033	445	673	146	284	841	866	37
24	052	357	766	027	474	667	175	278	869	858	36
25	18081	98352	19794	98021	21502	97661	23203	97271	24897	96851	35
26	109	347	823	016	530	655	231	264	925	844	34
27	138	341	851	010	559	648	260	257	953	837	33
28	166	336	880	004	587	642	288	251	982	829	32
29	195	331	908	97998	616	636	316	241	25010	822	31
30	224	325	937	992	644	630	345	237	038	815	30
31	18252	98320	19965	97987	21672	97623	23373	97230	25066	96807	29
32	281	315	994	981	701	617	401	223	094	800	28
33	309	310	20022	975	729	611	429	217	122	793	27
34	338	304	051	969	758	604	458	210	151	786	26
35	367	299	079	963	786	598	486	203	179	778	25
36	395	294	108	958	814	592	514	196	207	771	24
37	18424	98288	20136	97952	21843	97585	23542	97189	25235	96764	23
38	452	283	165	946	871	579	571	182	263	756	22
39	481	277	193	940	899	573	599	176	291	749	21
40	509	272	222	934	928	566	627	169	320	742	20
41	538	267	250	928	956	560	656	162	348	734	19
42	567	261	279	922	985	553	684	155	376	727	18
43	18595	98256	20307	97916	22013	97547	23712	97148	25404	96719	17
44	624	250	336	910	041	541	740	141	432	712	16
45	652	245	364	905	070	534	769	134	460	705	15
46	681	240	393	899	098	528	797	137	488	697	14
47	710	234	421	893	126	521	825	120	516	690	13
48	738	229	450	887	155	515	853	113	545	682	12
49	18767	98223	20478	97881	22185	97508	23882	97106	25573	96675	11
50	795	218	507	875	212	502	910	100	601	667	10
51	824	212	535	869	240	496	938	093	629	660	9
52	852	207	563	863	268	489	966	086	685	653	8
53	881	201	592	857	297	483	995	079	713	645	7
54	910	196	620	851	325	476	24023	072	741	638	6
55	18938	98190	0649	97845	22353	97470	24051	97065	25741	96630	5
56	967	185	677	839	382	463	079	058	769	623	4
57	995	179	706	833	410	457	108	051	798	615	3
58	19024	174	734	827	438	450	136	044	826	608	2
59	052	168	763	821	467	444	164	037	854	600	1
	N.Coſ	Nſine.	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	79		78		77		76		75		

A TABLE of Natural Sines.

	15		16		17		18		19		
M	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	NCoſ.	M
0	25882	96593	27564	96126	29237	95630	30902	95106	32557	94552	60
1	910	585	592	118	265	622	929	097	584	542	59
2	938	578	620	110	293	613	957	088	612	533	58
3	966	570	648	102	321	605	985	079	639	523	57
4	994	562	676	094	348	596	31012	070	667	514	56
5	26022	555	704	086	376	588	040	061	694	504	55
6	050	547	731	078	404	579	068	052	722	495	54
7	26079	96540	27759	96070	29432	95571	31095	95043	32749	94485	53
8	107	532	787	062	460	562	123	033	777	476	52
9	135	524	815	054	487	554	151	024	804	466	51
10	163	517	843	046	515	545	178	015	832	457	50
11	191	509	871	037	543	536	206	006	859	447	49
12	219	502	899	029	571	528	233	94997	887	438	48
13	26247	96494	27927	96021	29599	95519	31261	94988	32914	94428	47
14	275	486	955	013	626	511	289	979	942	418	46
15	303	479	983	005	654	502	316	970	969	409	45
16	331	471	28011	95997	682	493	344	961	997	399	44
17	359	463	039	989	710	485	372	952	33024	390	43
18	387	456	067	981	737	476	399	943	051	380	42
19	26415	96448	27095	95972	29765	95467	31427	94933	33079	94370	41
20	443	440	123	964	793	459	454	924	106	361	40
21	471	433	150	956	821	450	482	915	134	351	39
22	500	425	178	948	849	441	510	906	161	342	38
23	528	417	206	940	876	433	537	897	189	332	37
24	556	410	234	931	904	424	565	888	216	322	36
25	26584	96402	28262	95923	29932	95415	31592	94878	33244	94313	35
26	612	394	290	915	960	407	620	869	271	303	34
27	640	386	318	907	987	398	648	860	298	293	33
28	668	379	346	898	30015	389	675	851	326	284	32
29	696	371	374	890	043	380	703	842	353	274	31
30	724	363	402	882	071	372	730	832	381	264	30
31	26752	96355	28429	95874	30098	95363	31758	94823	33408	94254	29
32	780	347	425	865	126	354	786	814	436	245	28
33	808	340	413	857	154	345	813	805	463	235	27
34	836	332	541	849	182	337	841	795	490	225	26
35	864	324	569	841	209	328	868	786	518	216	25
36	892	316	569	832	237	319	896	777	545	206	24
37	26920	96308	28597	95824	30265	95310	31923	94768	33573	94196	23
38	948	301	625	816	292	301	951	758	600	186	22
39	976	293	652	807	320	293	979	749	627	176	21
40	27004	285	680	799	348	284	32006	740	655	167	20
41	032	277	708	791	376	275	034	730	682	157	19
42	060	269	736	782	403	266	061	721	710	147	18
43	27088	96261	28764	95774	30431	95257	32089	94712	33737	94137	17
44	116	253	792	766	459	248	116	702	764	127	16
45	144	246	820	757	486	240	144	693	792	118	15
46	172	238	847	749	514	231	171	684	819	108	14
47	200	230	875	740	542	222	199	674	846	098	13
48	228	222	903	732	570	213	227	665	874	088	12
49	27256	96214	28931	95724	30597	95204	32254	94656	33901	94078	11
50	284	206	959	715	625	195	282	646	929	068	10
51	312	198	987	707	653	186	309	637	956	058	9
52	340	190	29015	698	680	177	337	627	983	049	8
53	368	182	042	690	708	168	364	618	34011	039	7
54	396	174	070	681	736	159	392	609	038	029	6
55	27424	96166	29098	95673	30763	95150	32419	94599	34065	94019	5
56	452	158	126	664	791	142	447	590	093	009	4
57	480	150	154	656	819	133	474	580	120	93999	3
58	508	142	182	647	846	124	502	571	147	989	2
59	536	134	209	639	874	115	529	561	175	979	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	74		73		72		71		70		

A TABLE of Natural Sines.

	20		21		22		23		24		
M	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.ſine	M
0	34202	93969	35837	93358	37461	92718	39073	92050	40674	91355	60
1	229	959	864	348	488	707	100	039	700	343	59
2	257	949	891	337	515	697	127	028	727	331	58
3	284	939	918	327	542	686	153	016	753	319	57
4	311	929	945	316	569	675	180	005	780	307	56
5	339	919	973	306	595	664	207	91994	806	295	55
6	366	909	36000	295	622	653	234	982	833	283	54
7	34393	93899	36027	93285	37649	92642	39260	91971	40860	91272	53
8	421	889	054	274	676	631	287	959	880	260	52
9	448	879	081	264	703	620	314	948	913	248	51
10	475	869	108	253	730	609	341	936	939	236	50
11	503	859	135	243	757	598	367	925	966	224	49
12	530	849	162	232	784	587	394	914	992	212	48
13	34557	93839	36190	93222	37811	92576	39421	91902	41019	91200	47
14	584	829	217	211	838	565	448	891	045	188	46
15	612	819	244	201	865	554	474	879	072	176	45
16	639	809	271	190	892	543	501	868	098	164	44
17	666	799	298	180	919	532	528	856	125	152	43
18	694	789	325	169	946	521	555	805	151	140	42
19	34721	93779	36352	93159	37943	92510	39581	91833	41178	91128	41
20	748	769	377	148	999	499	608	822	204	116	40
21	775	759	406	137	38026	488	635	810	231	104	39
22	803	748	433	127	053	477	661	799	257	092	38
23	830	738	461	116	080	466	688	787	284	080	37
24	857	728	488	106	107	455	715	775	310	068	36
25	34884	93718	36515	93095	38134	92444	39741	91764	41337	91056	35
26	912	708	542	084	161	432	768	752	363	044	34
27	939	698	569	074	188	421	795	741	390	032	33
28	966	688	596	063	215	410	822	729	416	020	32
29	993	677	623	052	241	399	848	718	443	008	31
30	35021	667	650	042	268	388	875	706	469	90996	30
31	35048	93657	36677	93031	38295	92377	39902	91694	41496	90984	29
32	075	647	704	020	322	366	928	683	522	972	28
33	102	637	731	010	349	355	955	671	549	960	27
34	130	626	758	92999	376	343	982	660	575	948	26
35	157	616	785	988	403	332	40008	648	602	936	25
36	184	606	812	978	430	321	035	636	628	924	24
37	35211	93596	36839	92967	38456	92310	40062	91625	41655	90911	23
38	239	585	867	956	483	299	088	613	681	899	22
39	266	575	894	945	510	287	115	601	707	887	21
40	293	565	921	935	537	276	141	590	734	875	20
41	320	555	948	924	564	265	168	578	760	863	19
42	347	544	975	913	591	254	195	566	787	851	18
43	35375	93534	37002	92902	38617	92243	40221	91555	41813	90839	17
44	402	524	029	892	644	231	248	543	840	826	16
45	429	514	056	881	671	220	275	531	866	814	15
46	456	503	083	870	698	209	301	519	892	802	14
47	483	493	110	859	721	198	328	508	919	790	13
48	511	483	137	849	752	186	355	496	945	778	12
49	35538	93472	37164	92838	38778	92175	40381	91484	41972	90766	11
50	565	462	191	827	805	164	408	472	998	753	10
51	592	452	218	816	832	152	434	461	42024	741	9
52	619	441	245	805	859	141	461	449	051	729	8
53	647	431	272	794	886	130	488	437	077	717	7
54	674	420	299	784	912	119	514	425	104	704	6
55	35701	93410	37326	92773	38939	92107	40541	91414	42130	90692	5
56	728	400	353	762	966	096	567	402	156	680	4
57	755	389	380	751	993	085	594	390	183	668	3
58	782	379	407	740	39020	073	621	378	209	655	2
59	810	368	434	729	046	062	647	366	235	643	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	69		68		67		66		65		

A TABLE of Natural Sines.

	25		26		27		28		29		
M.	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	
0	42262	90631	43837	89879	45399	89101	46947	88295	48489	87462	60
1	288	618	863	867	425	087	973	281	506	448	59
2	315	606	889	854	451	074	999	267	532	434	58
3	341	594	916	841	477	061	47024	254	557	420	57
4	367	582	942	828	503	048	050	240	583	405	56
5	394	569	968	816	529	035	076	226	608	391	55
6	420	557	994	803	554	021	101	213	634	377	54
7	42446	90545	44020	89790	45580	89008	47127	88199	48659	87363	53
8	473	532	046	777	606	88995	153	185	684	349	52
9	499	520	072	764	632	981	178	172	710	335	51
10	525	507	098	752	658	968	204	158	735	321	50
11	552	495	124	739	684	955	229	144	761	306	49
12	578	483	151	726	710	942	255	130	786	292	48
13	42604	90470	44177	89713	45736	88928	47281	88117	48811	87278	47
14	631	458	203	700	762	915	306	103	837	264	46
15	657	446	229	687	787	902	332	089	862	250	45
16	683	433	255	674	813	88888	358	075	888	235	44
17	709	421	281	662	839	875	383	062	913	221	43
18	736	408	307	649	865	862	409	048	938	207	42
19	42762	90396	44333	89636	45891	88848	47434	88034	48964	87193	41
20	788	383	359	623	917	835	460	020	989	178	40
21	815	371	385	610	942	822	486	006	49014	164	39
22	841	358	401	597	968	808	511	87993	040	150	38
23	867	346	437	584	994	795	537	979	065	136	37
24	894	334	464	571	46020	782	562	985	090	121	36
25	42920	90321	44490	89558	46046	88768	47588	87951	49116	87107	35
26	946	309	516	545	072	755	614	937	141	093	34
27	972	296	542	532	097	741	639	923	166	079	33
28	999	284	568	519	123	728	665	909	192	064	32
29	43025	271	594	506	149	715	690	896	217	050	31
30	051	259	620	493	175	701	716	882	242	036	30
31	43077	90246	44646	89480	46201	88688	47741	87868	49268	87021	29
32	104	233	672	467	226	674	767	853	293	007	28
33	130	221	698	454	252	661	793	840	318	86993	27
34	156	208	724	441	278	647	818	826	344	978	26
35	182	196	750	428	304	634	844	812	369	964	25
36	209	183	776	415	330	620	869	798	394	949	24
37	43235	90171	44802	89402	46355	88607	47895	87784	49419	86935	23
38	261	158	828	389	381	593	920	770	445	921	22
39	287	146	854	376	407	580	946	756	470	906	21
40	313	133	880	363	433	566	972	743	495	892	20
41	340	120	906	350	458	553	997	729	521	878	19
42	366	108	932	337	484	539	48022	715	546	863	18
43	43392	90095	44958	89324	46510	88526	48048	87701	49571	86849	17
44	418	082	984	311	536	512	073	687	596	834	16
45	445	070	45010	298	561	499	099	673	622	820	15
46	471	057	036	285	587	485	124	659	647	805	14
47	497	045	062	272	613	472	150	645	672	791	13
48	523	032	088	259	639	458	175	631	696	777	12
49	43549	90019	45114	89245	46664	88445	48201	87617	49723	86762	11
50	575	007	140	232	690	431	226	603	748	748	10
51	602	89994	166	219	716	417	252	589	773	733	9
52	628	981	192	206	742	404	277	575	798	719	8
53	654	968	218	193	767	390	303	560	824	704	7
54	680	956	243	180	793	377	328	546	849	690	6
55	43706	89943	45269	89167	46819	88363	48354	87532	49874	86675	5
56	732	930	295	153	844	349	379	518	899	661	4
57	759	918	321	140	870	336	405	504	924	646	3
58	785	905	347	127	896	322	430	490	950	632	2
59	811	892	373	114	921	308	456	476	975	617	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	
	64		63		62		61		60		

A TABLE of Natural Sines.

	40		41.		42		43		44		
M	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N Coſ	M
0	64279	76604	65606	75471	66913	74314	68200	73135	69466	71934	60
1	301	586	628	452	935	295	221	116	487	914	59
2	323	567	650	433	956	276	242	096	508	894	58
3	346	548	672	314	978	256	264	076	529	873	57
4	368	530	694	395	999	237	285	056	549	853	56
5	390	511	715	375	67021	217	306	036	570	833	55
6	412	492	738	356	043	198	327	016	592	813	54
7	64435	76473	65759	75337	67064	74178	68349	72996	69612	71792	53
8	457	455	781	318	086	159	370	976	633	772	52
9	479	436	803	299	107	139	391	957	654	752	51
10	501	417	825	280	129	120	412	937	675	732	50
11	524	398	847	261	151	100	433	917	696	711	49
12	546	380	869	241	172	080	455	897	717	691	48
13	64568	76361	65891	75222	67194	74061	68476	72877	69737	71671	47
14	590	342	913	203	215	041	497	857	758	650	46
15	612	323	935	184	237	022	518	837	779	630	45
16	635	304	956	165	258	002	539	817	800	610	44
17	657	286	978	146	28	73983	561	797	821	590	43
18	679	267	66000	126	301	963	582	777	842	569	42
19	64701	76248	66022	75107	67323	73944	68603	72757	69862	71549	41
20	723	229	044	088	344	924	624	737	883	529	40
21	746	210	066	069	366	904	645	717	904	508	39
22	768	192	088	050	387	888	666	697	925	488	38
23	790	173	109	030	409	865	688	677	946	468	37
24	812	154	131	011	430	846	709	657	966	447	36
25	64834	76135	66153	74992	67452	73820	68730	72637	69987	71427	35
26	856	116	175	975	473	806	751	617	70008	407	34
27	878	097	197	953	495	787	772	597	029	386	33
28	901	078	218	934	516	767	793	577	049	366	32
29	923	059	240	915	538	747	814	557	070	345	31
30	945	041	262	896	559	728	835	537	091	325	30
31	64967	76022	66284	74876	67580	73708	68857	72517	70112	71305	29
32	989	003	306	858	602	688	878	497	132	284	28
33	65011	75984	327	838	623	669	899	477	153	264	27
34	033	965	349	818	645	649	920	457	174	243	26
35	055	946	371	799	666	629	941	437	195	223	25
36	077	927	393	780	688	610	962	417	215	203	24
37	65099	76908	66414	74700	67709	73590	68983	72397	70236	71182	23
38	122	889	436	741	730	570	69004	377	257	162	22
39	144	870	458	722	752	551	025	357	277	141	21
40	166	851	480	703	773	531	046	337	298	121	20
41	188	832	501	683	795	511	067	317	319	100	19
42	210	813	523	664	816	491	088	297	339	080	18
43	65232	75794	66545	74644	67837	73472	69109	72277	70360	71059	17
44	254	775	566	625	859	452	130	257	381	039	16
45	276	756	588	606	880	432	151	236	401	019	15
46	298	738	610	586	901	412	172	216	422	70998	14
47	320	719	632	567	923	393	193	196	443	978	13
48	342	699	653	548	944	373	214	176	463	957	12
49	65364	75680	66675	74528	67965	73353	69235	72156	70484	70937	11
50	386	661	697	509	987	333	256	136	505	916	10
51	408	642	718	489	68008	314	277	116	525	896	9
52	430	623	740	470	029	294	298	095	546	875	8
53	452	604	762	451	051	275	319	075	567	855	7
54	474	585	783	431	072	254	240	055	587	834	6
55	65496	75566	66805	74412	68093	73234	69361	72035	70608	70813	5
56	518	547	827	392	115	215	382	015	628	793	4
57	540	528	848	373	136	195	403	71995	649	772	3
58	562	509	870	353	157	175	424	974	670	752	2
59	583	490	891	334	179	155	445	954	690	731	1
	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N.ſine	N.Coſ	N. ſine	N.Coſ	N.ſine	
	49		48		47		46		45		

A Table ſhewing the Time of the Sun, Moon, and Star's Setting, when they have North Declination, or the Time of their Riſing, when they have South Declination.

DEGREES OF DECLINATION.

Lat.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	2329	Lat.
	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
1°	6.00	6.00	6.0	6.00	6.00	6.00	6.02	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	1°
2	6.00	6.00	6.0	6.00	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	6.02	6.02	6.03	6.03	6.03	6.03	6.03	6.03	6.04	2
3	6.00	6.00	6.0	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	6.02	9.03	6.03	6.03	6.03	6.04	6.04	6.04	6.04	6.05	6.05	6.05	6.05	3
4	6.00	6.00	6.00	6.01	6.01	6.01	6.02	6.02	6.02	6.03	6.03	6.03	6.03	6.04	6.04	6.04	6.05	6.05	6.05	6.05	6.06	6.06	6.06	6.07	6.07	4
5	6.00	6.00	6.01	6.01	6.01	6.02	6.02	6.02	6.03	6.03	6.04	6.04	6.04	6.05	6.05	6.05	6.06	6.06	6.07	6.07	6.07	6.08	6.08	6.09	6.09	5
6	6.00	6.00	6.01	6.01	6.02	6.02	6.03	6.03	6.03	6.04	6.04	6.05	6.05	6.06	6.06	6.06	6.07	6.07	6.08	6.08	6.09	6.09	6.10	6.10	6.11	6
7	6.00	6.00	6.01	6.01	6.02	5.02	6.03	6.03	6.04	6.04	6.05	6.05	6.06	6.06	6.07	6.08	6.08	6.09	6.09	6.10	6.10	6.11	6.11	6.12	6.12	7
8	6.00	6.00	6.01	6.02	6.02	6.03	6.03	6.04	6.04	6.05	6.06	6.06	6.07	6.07	6.08	6.09	6.09	6.00	6.10	6.10	6.12	6.12	6.13	6.14	6.14	8
9	6.00	6.10	6.01	6.02	6.02	6.03	6.03	6.04	6.05	6.06	6.06	6.07	6.08	6.08	6.09	6.10	6.10	6.11	6.12	6.13	6.14	6.14	6.15	6.15	6.16	9
10	6.00	6.1	6.01	6.02	6.03	6.04	6.04	6.05	6.06	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.12	6.13	6.14	6.15	6.16	6.16	6.17	6.17	10
11	6.00	6.1	6.02	6.02	6.03	6.04	6.05	6.05	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.13	6.14	6.14	6.15	6.16	6.17	6.18	6.19	6.19	11
12	6.00	6.1	6.02	6.03	6.04	6.04	6.05	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.18	6.19	6.20	6.21	6.21	12
13	6.00	6.1	6.02	6.03	6.04	6.05	6.06	6.06	6.07	6.08	6.09	6.10	5.11	6.12	6.13	6.14	6.15	6.16	6.17	6.18	6.19	6.20	6.21	6.22	6.23	13
14	6.00	6.1	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.00	6.11	6.12	6.13	6.14	6.15	6.16	6.17	6.19	6.20	6.21	6.22	6.23	6.24	6.25	14
15	6.00	6.1	6.02	6.03	6.04	6.05	6.06	6.07	6.09	6.10	6.01	6.12	6.13	6.14	6.15	6.16	6.18	6.19	6.20	6.21	6.22	6.24	6.29	6.26	6.27	15
16	6.00	6.1	6.02	6.03	6.05	6.06	6.07	6.08	6.09	6.10	6.12	6.13	6.14	6.15	6.16	6.18	6.19	6.20	6.21	6.23	6.24	6.25	6.27	6.28	6.29	16
17	6.00	6.1	6.02	6.04	6.05	6.06	6.07	6.09	6.10	6.12	6.12	6.13	6.15	6.16	6.17	6.19	6.20	6.21	6.23	6.24	6.25	6.27	6.28	6.30	6.31	17
18	6.00	6.1	6.02	6.04	6.05	6.06	6.08	6.09	6.10	6.13	6.13	6.14	6.16	6.17	6.19	6.20	6.21	6.22	6.24	6.26	6.27	6.29	6.30	6.32	6.33	18
19	6.00	6.1	6.03	6.04	5.05	6.07	6.08	6.10	6.11	6.13	6.14	6.15	6.17	6.18	6.20	6.21	6.23	6.24	6.26	6.27	6.28	6.30	6.31	6.33	6.34	19
20	6.00	6.1	6.03	6.04	6.05	6.07	6.09	6.10	6.12	6.14	6.15	6.16	6.18	6.19	6.21	6.22	6.24	6.25	6.27	6.29	6.30	6.32	6.33	6.35	6.36	20
21	6.00	6.1	6.03	6.05	6.06	6.08	6.09	6.11	6.12	6.14	6.16	6.17	6.19	6.20	6.22	6.24	6.25	6.27	6.29	6.30	6.32	6.34	6.35	6.37	6.38	21
22	6.00	6.2	6.03	6.05	6.06	6.08	6.10	6.11	6.13	6.15	6.16	6.18	6.20	6.21	6.23	6.25	6.27	6.28	6.30	6.32	6.34	6.36	6.37	6.39	6.40	22
23	6.00	6.2	6.03	6.05	6.07	6.09	6.10	6.12	6.14	6.15	6.17	6.19	6.21	6.23	6.24	6.26	6.28	6.30	6.32	6.34	6.36	6.37	6.39	6.41	6.42	23
24	6.00	6.2	6.03	6.05	6.07	6.09	6.11	6.13	6.14	6.16	6.18	6.20	6.22	6.24	6.25	6.27	6.29	6.31	6.33	6.35	6.37	6.39	6.4	6.43	6.44	24
25	6.00	6.2	6.04	6.06	6.07	6.09	6.11	6.13	6.15	6.17	6.19	6.21	6.23	6.25	6.27	6.29	6.31	6.33	6.35	6.37	6.39	6.41	6.4	6.46	6.47	25
26	6.00	6.2	6.04	6.06	6.08	6.10	6.12	6.14	6.16	6.18	6.20	6.22	6.24	6.26	6.28	6.30	6.32	6.34	6.36	6.39	6.41	6.43	6.45	6.48	6.49	26
27	6.00	6.2	6.04	6.06	6.08	6.10	6.12	6.14	6.16	6.19	6.21	6.23	6.25	6.27	6.29	6.31	6.34	6.36	6.38	6.40	6.43	6.45	6.48	6.50	6.51	27
28	6.00	6.2	6.04	6.06	6.09	6.11	6.13	6.15	6.17	6.19	6.22	6.24	6.26	6.28	6.30	6.33	6.35	6.37	6.40	6.42	6.45	6.47	6.50	6.52	6.53	28
29	6.00	6.2	6.04	6.07	6.09	6.11	6.13	9.16	6.18	6.20	6.23	6.25	6.27	6.29	6.32	6.34	6.37	6.39	6.42	6.44	6.47	6.49	6.52	6.54	6.55	29
30	6.00	6.2	6.05	6.07	6.09	6.12	6.14	6.16	6.19	6.21	6.23	6.26	6.28	6.31	6.33	6.36	6.38	6.41	6.4	6.46	6.48	6.51	6.54	6.57	6.58	30

A Table ſhewing the Time of the Sun, Moon, and Star's Setting, when they have North Declination, or the Time of their Riſing, when they have South Declination.

Lat.	DEGREES OF DECLINATION.																								Lat.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	2329	
	M H	M H	M H	M H	M H	M H	M H	H M	H M	H M	H M	N M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	H M	
31°	6 00	6.02	6.05	6.07	6.10	6.12	6.15	6.17	6.19	6.22	6.24	6.27	6.29	6.32	6.34	6.37	6.40	6.42	6.45	6.48	6.51	6.53	6.56	6.59	4.01	31
32	6.00	6.02	6.05	6.08	6.10	6.13	6.15	6.18	6.20	6.23	6.25	6.28	6.31	6.33	6.36	6.39	6.41	6.44	6.47	6.50	6.53	6.56	6.58	7.01	7.03	33
33	6.00	6.03	6.05	6.08	6.10	6.13	6.16	6.18	6.21	6.24	6.26	6.29	6.32	6.34	6.37	6.40	6.43	6.46	6.49	6.52	6.55	6.58	7.01	7 04	7.06	32
34	6.00	6.03	6.05	6.08	6.11	6.14	6.16	6.19	6.22	6.25	6.27	6.30	6.33	6.36	6.39	6.42	6.45	6.48	6.51	6.54	6.57	7.00	7.03	7.06	7.08	34
35	6.00	6.03	6.06	6.08	6.11	6.14	6.17	6.20	6.23	6.25	6.28	6.31	6.34	6.37	6.40	6.43	6.46	6.49	6.53	6.56	6.59	7.02	7.06	7.09	7.11	35
36	6.00	6.03	6.06	6.09	6.12	6.15	6.18	6.20	6.23	6.26	6.29	6.32	6.36	6.39	6.42	6.45	6.48	6.51	6 55	6.28	7.01	7.05	7.08	7.12	7.14	36
37	6.00	6.03	6.06	6.09	6.12	6.15	6.18	6.21	6 24	6.27	6.31	6.34	6.37	6.40	6.43	6.47	6.50	6.53	6.57	7.00	7.04	7.07	7.11	7.15	7.17	37
38	6.00	6.03	6.06	6.09	6.13	6.16	6.19	6.22	6.25	6.28	6.32	6.35	6.38	6.42	6.45	6.48	6.52	6.55	6.59	7.02	7.06	7.10	7.14	7.17	7.19	38
39	6.00	6.03	6.06	6.10	6.13	6.16	6.20	6.23	6.26	6.29	6.32	6.36	6.40	6.43	6.47	6.50	6.44	6.57	7.01	7.05	7.09	7.12	7.16	7.20	7.22	39
40	6.00	6.03	6.07	6.10	6.13	6.17	6.20	6.24	6.27	6.31	6.24	6.38	6.41	6.45	6.48	6.52	6.45	7.00	7.03	7.07	7.11	7.15	7.19	7.23	7.25	40
41	6.00	6.03	6.07	6.10	6.14	6.17	6.21	6.25	6.28	6.32	6.35	6.39	6.43	6.46	6.50	6.54	6.46	7.02	7.06	7.10	7.14	7.18	7.22	7.27	7.29	41
42	6.00	6.04	6.07	6.11	6.14	6.18	6.22	6.25	6.29	6.33	6.37	6.40	6.44	6.48	6.52	6.50	7.48	7.04	7.08	7.12	7.17	7.21	7.25	7.30	7.32	42
43	6.00	6.04	6.07	6.11	6.15	6.19	6.22	6.26	6.30	6.34	6.38	6.42	6.46	6.50	6.54	6.58	7.50	7.06	7.11	7.15	7.19	7.24	7.28	7.33	7.36	43
44	6.00	6.04	6.08	6.12	6.15	6.19	6.23	6.27	6.31	6.35	6.39	6.43	6.47	6.52	6.56	6.00	7.52	7.09	7.15	7.18	7.22	7.27	7.31	7.36	7.39	44
45	6.00	6.04	6.08	6.12	6.16	6.20	6.24	6.28	6.32	6.36	6.41	6.45	6.49	6.53	6.58	6.02	7.44	7.11	7.16	7.21	7.25	7.30	7.35	7.40	7.43	45
46	6.00	6.04	6.08	6.12	6.17	6.21	6.25	6.29	6.33	6.38	6.42	6.46	6.51	6.55	7.00	7.04	7.09	7.14	7.19	7.24	7.29	7.34	7.39	7.44	7.47	46
47	6.00	6.04	6.09	6.13	6.17	6.22	6.26	6.30	6.35	6.39	6.43	6.48	6.53	6.57	7.02	7.07	7.12	7.17	7.21	7.27	7.32	7.37	7.43	7.48	7.51	47
48	6.00	6.04	6.09	6.13	6.18	6.22	6.27	6.31	6.36	6.41	6.45	6.50	6.55	6.59	7.04	7.09	7.14	7.19	7.25	7.30	7.35	7.41	7.47	7.53	7.56	48
49	6.00	6.05	6.09	6.14	6.18	6.23	6.28	6.32	6.37	6.42	6.47	6.52	6.57	7.02	7.07	7.12	7.17	7.22	7.28	7.33	7.49	7.45	7.51	7.57	8.00	49
50	6.00	6.05	6.10	6.14	6.19	6.24	6.29	6.34	6.39	6.44	6.49	6.54	6.59	7.04	7.09	7.14	7.20	7.25	7.31	7.37	7.43	7.49	7.55	8.02	8.05	50
51	6.00	6.05	6.10	6.15	6.20	6.25	6.30	6.35	6.40	6.45	6.50	6.56	7.01	7.06	7.12	7.17	7.23	7.29	7.35	7.41	7.47	7.53	8.00	8.06	8.10	51
52	6.00	6.05	6.10	6.15	6.21	6.26	6.31	6.36	6.41	6.47	6.52	6.58	7.03	7.09	7.14	7.20	7.26	7.32	7.38	7.45	7.51	7.58	8.05	8.12	8.16	52
53	6.00	6.05	6.11	6.16	6.21	6.27	6.32	6.38	6.43	6.49	6.54	7.00	7.06	7.11	7.17	7.23	7.29	7.36	7.42	7.49	7.56	8.03	8.10	8.17	8.21	53
54	6.00	6.06	6.11	6.17	6.22	6.28	6.33	6.39	6.45	6.50	6.56	7.02	7.08	7.14	7.20	7.27	7.33	7.40	7.46	7.52	8.00	8.08	8.15	8.23	8.27	54
55	6.00	6.06	6.11	6.17	6.23	6.29	6.35	6.40	6.46	6.52	6.58	7.04	7.11	7.17	7 23	7.30	7.37	7.44	7.51	7.58	8.05	8.13	8.21	8.29	8.33	55
56	6.00	6.06	6.12	6.18	6.24	6.30	6.36	6.42	6.48	6.54	7.00	7.07	7.13	7.20	7.27	7.34	7.41	7.48	7.55	8.03	8.11	8.19	8.27	8.32	8.41	56
57	6.00	6.06	6.12	6.19	6.25	6.31	6.37	6.44	6.50	6.56	7.03	7.10	7.16	7.23	7.30	7.38	7.45	7.52	8.00	8.08	8.16	8.25	8.34	8.43	8.48	57
58	6.00	6.06	6.13	6.19	6.26	6.32	6.39	6.45	6.52	6.58	7.06	7.13	7.20	7.27	7.34	7.42	7.49	7.57	8.05	8.14	8.22	8.22	8.41	8.51	8.56	58
59	6.00	6.07	6.13	6.20	6.27	6.33	6.40	6.47	6.54	6.01	7.08	7.16	7.23	7.30	7.38	7.46	7.54	8. 3	8.11	8.20	8.29	8.39	8.49	9.00	9.05	59
60	6.00	6.07	6.14	6.21	6.28	6.33	6.42	6.49	6.56	6.04	7.11	7.19	7.26	7.34	7.42	1.51	7.59	8. 8	8.17	8.26	8.36	8.37	8.58	9.09	9.16	60

To find the Time of the Sun's Riſing, Setting, and Length of the Day and Night, by theſe Tables.

Firſt. Find the Sun's Declination at the Top of the Page, marked with the Degrees of Declination, and the Latitude in the Right, or Left Hand Columns (marked Lat.) and in the common Angle of Meeting is the Time of Sun-ſetting, if the Sun has North Declination, but the Time of Sun-riſing if the Sun has South Declination.

EXAMPLE I.

Let it be required to find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, in Latitude 51° North, the 18th of July, 1784?

I firſt ſeek the Sun's Declination for the given Day, and find it 20° 55′ North, which I here call 21°, then under the Declination 21, and againſt the Latitude 51°, ſtands 7 Hours 53 Minutes, the Time the Sun ſets on the given Day, in Lat. 51 North, which being doubled, gives 15 Hours, 46 Minutes, the Length of the Day; and, if 7 Hours, 53 Minutes, the Time of Sun-ſetting be ſubtracted from 12 Hours, the Remainder 4 Hours, 7 Minutes, gives the Time of the Sun's Riſing, which being doubled, gives 8 Hours, 14 Minutes, the Length of the Night.

But, when the Sun has 21° South Declination in this Latitude, the Time of Sun-Setting becomes the Time of Sun-Riſing, and the Length of the Day, will then become the Length of the Night.

Thus, the 25th of November, 1784, the Sun's Declination is 20° 57′ South, or 21°, then the Time of Sun Riſing is 7 Hours, 53 Minutes, his Setting 4 Hours, 7 Minutes, and the Length of the Night 15 Hours, 46 Minutes, and Day 8 Hours, 14 Minutes.

EXAMPLE II.

Let it be required to find the Time of the Sun's Riſing, Setting, and Length of the Day and Night at Peterſberg, the 21ſt of June, 1788.

Under 23° 28′ N. the Declination that Day, and againſt 60° North, the Latitude of Peterſberg.	12	0
Stands the Sun's Setting	9	19
The Time of Sun Riſing	2	41
S. ſetting doubled is the Len. of Day	18	38
S. Riſing doubled is the Len. Night	5	22

EXAMPLE III.

Required the Time of the Sun's Riſing and Setting, and Length of the Day at the Cape of Good Hope, in Lat. 34. 22 S. the 15th May, 1784.

Under the Declination 19° 4′ or 19°, N. and againſt the Lat. 34 S.	12	0
Stands the Sun's Riſing	6	53
Time of Sun's Setting	5	7
		2
The Length of the Day	10	14
And 6 H. 53 M. doub. is Len. of Night	13	46

When a greater Degree of Accuracy is required, proportional Parts may be taken for Degrees and Minutes of Lat. and Declination.

To find the Riſing and Setting of the Stars.

By theſe Tables the Riſing and Setting of any Star may be found, whoſe Declination does not exceed 23° 30′ North or South, in the following Manner:

If you are in North Latitude, and the Star has North Declination, look for the Declination at the Top, and the Latitude in the Right or Left Hand Columns, in the Angle of Meeting is Half the Time of the Star's continuance above the Horizon, in that Latitude; or the Time it takes in Aſcending from the Eaſtern Side of the Horizon to the Meridian, and Deſcending from the Meridian to the Weſtern Part of the Horizon.

Therefore, if theſe Hours and Minutes be ſubtracted from the Time of the Star's coming to the Meridian, the Remainder will be the Time of the Star's Riſing, and if added, the Sum will be the Time of the Star's Setting.

EXAMPLE I.

Required when the Star Arcturus Riſes and Sets, December 1, in Lat.	51°N.	
The Time of the Star's coming to the Meridian, or Southing in the Morning	9	34
Then under Star's Declination 20° 2′ or 20° N. and againſt Lat. 51 ſtands	7	47
Time of Star's Riſing in the Morning	1	47
	17	21
	12	
Star Sets 21 Minutes after 5 in the Evening	5	21

When the Latitude is North, and the Star has South Declination, or the Latitudes South and the Star has North Declination; find the Latitude in the ſide Columns as before, againſt which, and under the Degrees of Declination, ſtands half the Time the Star is under the Horizon, which being ſubtracted from 12, the Remainder will be half the Time the Star will be above the Horizon in that Latitude.

Example. What Time will the Dog Star, Sirius, Riſe and Set at London, Jan. 25.	12 0
Under the Declination 16° 25′ S. and againſt Lat. 51° 32′ ſtands	7 26
Half the Time the Star is above the Horizon	4 34
The Star comes to the Meridian in the Evening, at	10 00
Which Subtracted ſhews that the Star Riſes at 26 M. after 5 in the Evening	5 26
Added ſhews the Time the Star ſets in the Morning	2 34

In like Manner may the Riſing and Setting of the Planets be found when their Declination does not exceed 23° ½, and the Time of their Paſſage over the Meridian is known.

Suppoſe it were required to know the Time of Jupiter's Riſing and Setting, in Latitude 52 North, the 1ſt of March, 1780.

In the Nautical Almanac for 1780, I find that Jupiter paſſes the Meridian the 1ſt of March, at 14 H. 46 M. (that is 46M. after 2, next Morning) and his Declination is 8° 51′S.

Now, 14 H. 46 M added to 12 H. is 36 H. 46 M. from which ſubtract 24 H. and the Remainder 2 H. 46 M. is the Time of his paſſing the Meridian in the Morning, on the given Day.

Under the Decl. 8° 51′ or 9° and againſt Lat. 32° ſtands 6 H. 47 M. half the Time that Jupiter is below the Horizon, from which ſubtract 12, and the Remainder 5 H. 13 M. is half the Time Jupiter is above the Horizon in that Latitude.

Now 5 H. 13 M. added to Jupiter's Southing, gives 7 H. 59 M. the Time of his Setting in the Morning.

And 2 H. 46 M. added to 12 H. is 14 H. 46 M. from which take 5 H. 13 M. and the Remainder 9 H. 33 M. is the Time of his Riſing in the Evening, on the given Day.

Suppoſe it were required to find the Moon's Riſing and Setting the 5th of November, 1780, in Lat. 51° North.

In the Nautical Almanac, Nov. 5, her Declination is 14° 10′ S. and paſſes over the Meridian, at 7 H. 42 M. in the Afternoon. Then in the Tables under Decl. 14° and againſt Lat. 51° ſtands 7 H. 12 M. half the Time ſhe is under the Horizon, which ſubtracted from 12 H. leaves 4 H. 48 M. half the Time ſhe is above it.

Then 7 H. 42 M. added to 4 H. 48 M. is 12 H. 30 M. that is, the Moon ſets 30 M. after Twelve at Night, and from 7 H. 42 M. take 4 H. 48 M. the Remainder 2 H. 54 M. is the Time of the Moon's Riſing in the Afternoon.

In like Manner may be found the Riſing and Setting of the other Planets, only obſerving, that the Day in the Nautical Almanac, begins at the Noon of the Common Day, or 12 Hours later than the Common Day.

N. B. As all the Calculations here are made for the Meridian of London, Care muſt be taken to reduce the Time to the Meridian of the Place of Obſervation, by allowing 1 H. later for every 15° of Longitude, when the Longitude is Weſt, and 1 H. earlier for every 15° Eaſt, and proportionably for other Times; for it muſt be obſerved, that the End of the Sea Day, the Noon of the Common Day, and Beginning of the Day in the Nautical Almanac, are all the ſame Time.

The Method of Stating the ſeveral CASES in PLANE, MIDDLE LATITUDE and MERCATOR's SAILING, which may be worked either by the Logarithms, or by the Scale and Compaſſes.

PLANE SAILING.

CASE I.

When the Courſe and Diſtance are given—Say,

As Radius	and	As Radius
Is to the Diſtance,		Is to the Diſtance,
So is the Sine of the Courſe		So is the Sine Complement of the Courſe
To the Departure.		To the Difference of Latitude.

CASE II.

When the Courſe and Difference of Latitude are given---Say,

As the Sine Com. of the Courſe	and	As Sine Com. of the Courſe
Is to the Difference of Latitude,		Is to the Difference of Latitude,
So is the Sine of the Courſe		So is Radius
To the Departure.		To the Diſtance.

CASE III.

When the Courſe and Departure are given—Say

As the Sine of the Courſe	and	As the Sine of the Courſe
Is to the Departure,		Is to the Departure,
So is the Sine Com. of the Courſe		So is Radius
To the Difference of Latitude.		To the Diſtance.

CASE IV.

When the Diſtance and Difference of Latitude are given—Say

As the Diſtance	and	As Radius
Is to Radius,		Is to the Diſtance,
So is the Difference of Latitude		So is the Sine of the Courſe
To the Sine Com. of the Courſe.		To the Departure.

CASE V.

When the Diſtance and Departure are given—Say,

As the Diſtance	and	As Radius
Is to Radius,		Is to the Diſtance,
So is the Departure		So is the Sine Com. of the Courſe
To the Sine of the Courſe		To the Difference of Latitude.

CASE VI.

When the Difference of Latitude and Departure are given—Say,

As the Difference of Latitude	and	As the Sine of the Courſe
Is to Radius		Is to the Departure,
So is the Departure		So is Radius
To the Tangent of the Courſe		To the Diſtance.

The

The Method of Working the CASES in MIDDLE LATITUDE and MERCATOR'S SAILING.

CASE I.

When the Latitudes and Longitudes of two Places are given—Say

By Mercator's Sailing.	By Middle Latitude Sailing.
1. As the Meridional Difference of Latitude Is to Radius So is the Difference of Longitude To the Tangent of the Courſe.	1. As Radius Is to the Difference of Longitude, So is the Sine Com. of Middle Latitude To the Departure.
2. As the Sine Com. of the Courſe Is to the proper Difference of Latitude, So is the Sine of the Courſe To the Departure.	2. As the Difference of Latitude Is to Radius, So is the Departure To the Tangent of the Courſe.
3. As the Sine Com. of the Courſe Is to the proper Difference of Latitude, So is Radius To the Diſtance.	3. As the Sine of the Courſe Is to the Departure, So is Radius To the Diſtance.

CASE II.

When the Courſe and Diff. of Latitude are given to find the Diſt. and Diff. of Long.---Say,

1. As the Sine Com. of the Courſe Is to the proper Difference of Latitude, So is the Sine of the Courſe To the Departure.	1. As the Sine Com. of the Courſe Is to the Difference of Latitude, So is the Sine of the Courſe To the Departure.
2. As the Sine Com. of the Courſe Is to the proper Diff. of Latitude, So is Radius To the Diſtance.	2. As the Sine Com. of the Courſe Is to the Difference of Latitude, So is Radius To the Diſtance.
3. As the Sine Com. of the Courſe Is to the Meridional Diff. of Latitude, So is the Sine of the Courſe To the Diff. of Long.	3. As Com. of Middle Latitude Is to the Departure, So is Radius To the Difference of Longitude.

CASE III.

When the Courſe and Diſtance are given, to find the Difference of Latitude and Long.—Say,

1. As Radius Is to the Diſtance, So is the Sine Com. of the Courſe To the Difference of Latitude.	1. As Radius Is to the Diſtance, So is the Sine Com. of the Courſe To the Difference of Latitude.
2. As Radius Is to the Diſtance, So is the Sine of the Courſe To the Departure.	2. As Radius Is to the Diſtance, So is the Sine of the Courſe To the Departure.
3. As Sine Com. of the Courſe Is to the Meridional Difference of Lat. So is the Sine of the Courſe To the Difference of Longitude.	3. As the Sine Com. of Middle Latitude Is to the Departure, So is Radius To the Diff. of Longitude.

CASE IV.

When the Diff. of Lat. and Departure are given to find the Diſt. and Diff. of Long.---Say,

1. As the Difference of Latitude Is to Radius, So is the Departure To the Tangent of the Courſe.	1. As the Difference of Latitude Is to Radius, So is the Departure To the Tangent of the Courſe.
2. As the Sine of the Courſe Is to the Departure, So is Radius To the Diſtance.	2. As the Sine of the Courſe Is to the Departure, So is Radius To the Diſtance.
3. As the Sine Com. of the Courſe Is to the Meridional Diff. of Latitude, So is the Sine of the Courſe To the Diff. of Longitude.	3. As the Sine Com. of Middle Latitude Is to the Departure, So is Radius To the Difference of Longitude.

NOTE. Theſe are all the Caſes that can happen at Sea, unleſs a Ship happens to ſail due Eaſt or Weſt, in which Caſe, ſay, As the Sine Com. of the Latitude ſailed in, Is to the Diſtance ſailed, So is Radius to the Difference of Longitude.

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